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# ON THE
# ANATOMY AND DISEASES
# OF THE
# URINARY
# AND
# SEXUAL ORGANS.

CONTAINING
THE ANATOMY OF THE BLADDER AND OF THE URETHRA,
AND THE TREATMENT OF THE OBSTRUCTIONS TO
WHICH THESE PASSAGES ARE LIABLE.

BY G. J. GUTHRIE, F.R.S.
SURGEON TO THE WESTMINSTER HOSPITAL,
AND TO THE ROYAL WESTMINSTER OPHTHALMIC HOSPITAL, ETC. ETC.

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# ADVERTISEMENT.

The First Edition of this book was published at the request of the Medical Officers of the Army and Navy who attended my Surgical Lectures. Time has confirmed the views I entertained of the Anatomy and Surgery of the parts of which it treats, and which were then considered to be new; whilst the experience I have since acquired has also, I hope, enabled me to make this volume more worthy of their good opinion. It has been almost entirely re-constructed; and I have endeavoured to render the directions for the treatment of each particular complaint so plain, that any one of even moderate capacity may understand and practise them. I have divided the work into two parts, of which this is the first; and I have done so, because it is inconvenient to me to superintend the printing of a large book, and it is more convenient for those who buy, to purchase that part only which they want. The second part will follow with the least possible delay; and will contain, the Chronic Complaints of the Prostate, the Diseases of the Bladder, the Treatment of Calculous Affections, and the various Modes of Operating for the Removal of a Stone from the Bladder.

*4, Berkeley Street, Berkeley Square.*
*May 1st,* 1843.

# CONTENTS.

## CHAPTER I.

### ON THE STRUCTURE OF THE BLADDER.

General observations, 1.—Anatomy and relative situation differ from opinions generally entertained, 2.—General description of the bladder and ureters, 3.—Surgical symptoms from a stone in the orifice of a ureter, 4—manner of entrance of the ureters into the bladder, 5—the object of such formation, 5—the triangular space, 6—peculiarities of, 7.—Muscular coats of the bladder, 8.—Neck of the bladder elastic, not muscular, 9.—Stricture at the neck of the bladder, 11.—Structure of the prostate gland, 11—in the fœtus, 12—manner of application to the urethra, 13.—The elastic structure of the neck may be affected without prostatic disease, 14—stages of, 15—cases of, with pouches, 16, 17—causing the *fluttering strokes of the bladder* mistaken for stone, 18, 19.—State of the prostate, or corpus globosum, in the female, 20.

## CHAPTER II.

### ON THE STRUCTURE OF THE URETHRA.

The membranous part, 21—surrounded by a peculiar muscle, partly described by Mr. Wilson, 21—fully described by the author, 22—found in the female, proving it not to be for sexual purposes, 23—the bulbous part, 24.—Acceleratores urinæ muscles described, 24.—Length of urethra, 25.—Cowper's glands and ducts, 26—in the male and female, 26.—Lacunæ and follicles in the urethra, 26—abscess and ulceration of one near the frœnum, 27.—Width of the urethra in places, 29—the orifice the smallest part, 28—peculiar structure of, 28.—Selection of an instrument for examining the urethra, 29—natural obstacles in the urethra, 30.—Shape of instruments, 31—manner of using them, 32—in lateral enlargement of the prostate and at the posterior part, 32—use of a particular shape when there is a bar at the neck of the bladder, 34—passage of a common instrument, 34—difference of manner in using a solid silver, or an elastic gum bougie or catheter, 35—Dr. Civiale's opinion, 36—diagram showing shape of catheters, 37.—

Inner membrane of the urethra, 38.—Corpus spongiosum, 39.—Elasticity of the urethra, 40.—Tumours in, and cases, 41.—Appearance of urethra, 43.—Urethra usually lacerated anterior to the membranous part, 44.

## CHAPTER III.

### ON THE FORMATION OF SPASMODIC AND PERMANENT STRICTURE.

Inorganic and vital elasticity of the urethra, 45.—Spasmodic and permanent stricture, 45.—On spasmodic stricture, 45.—Cases called spasmodic are usually inflammatory, 46, 47.—On permanent stricture, 48.—Cases, 49.—Undue dilatation, case of, 50—of false passage, 51.—Formation of a false membrane, 53.—Case of Col. H., false passage and stone, 54.—Contractions in children, 55.—Permanent stricture of two kinds, 55.—Caruncles, excrescences, treatment of, 55—in the female urethra, 56.—Nature of obstruction cases, 57.—Canal in front not affected, behind not always enlarged, 58.—Stone impacted behind a stricture, cases of, 59.

## CHAPTER IV.

### SYMPTOMS OF AND MEANS OF CURE OF STRICTURE.

Prevail from the age of puberty to that of forty-five in a young men, 60—at an advanced stage, 61—inducing disease of the bladder and death, 63.—Testes affected, 64.—Bladder burst, urethra ruptured, 64.—Extravasation of urine, 65.—Abscess in perineo, 65—opening into the rectum, case of, 66.—On the method of examining the urethra, 67—passage of a bougie, 68—folds in the urethra, 69.—Use of a large instrument in elderly people, 69.—On the means of cure: four in number, 70.—On the cure by dilatation, 71.—Manner of proceeding with a common bougie, soft or solid, 71.—Taking an impression of a stricture, mode of, 72—diagram of impression on model bougies, 73—enlargement of the orifice of the urethra, 73—different attempts to obtain a good dilating instrument, 74, 76.—On the destruction of strictures by caustic, 76.—On the argentum nitratum, 77.—Cases to which it is applicable, 78—not applicable, paroxysms of ague, hemorrhage, 79—different modes of applying it, 80—Lallemand's method, 81.—Application of the unguentum argenti nitratis, mode of, 82.—On the potassæ fusa as a caustic, 83.—Hemorrhages from the urethra, 85.—Cases of, and treatment, 86, 91.—On the division of a stricture by Mr. Stafford's method, 92.—On the removal of a portion of the urethra, 94.

## CHAPTER V.

### ON THE TREATMENT OF IMPASSABLE STRICTURE.

By permanent pressure made with an elastic bougie, 96—cases illustrative of its efficacy, 98, 101.—By occasional pressure of a solid bougie, 104.—False passages not so dangerous as commonly supposed, 105—usual manner of making them, 106.—On removing the obstruction by operation, and the method, 107.—Directions for dissecting the parts concerned in it, 109.—this operation performed in Van Diemen's Land with success, 110.—When the catheter ought or ought not to be retained in the bladder, 111.—Sir B. Brodie's modification of the operation commonly performed, 112.—Mr. White's case, 113.—Dr. O'Halloran's, 113.—Operation by pressure, by partial division, or of the face of the stricture; and cases, 113, 115.—The catheter afterwards carried through the obstruction, and cases, 115, 120.

## CHAPTER VI.

### ON SUPPRESSION AND RETENTION OF URINE.

Difference between suppression and retention, 121.—Cause of death, 122.—Period for giving relief by operation, 122.—Retention from inflammation, cases, 123.—Manual treatment, 124, 125.—French method of forcing a passage reprobated, 126.—Means which may be employed, 126.—General treatment, 127.—Opium, the heroic remedy, 127.—Symptoms preceding rupture of the urethra, 128.—Five methods of operating for its prevention, 129.—General treatment, 130.—Erysipelas of the scrotum, 131.—Abscess in perineo, 131.—Fistula in perineo, 132.

## CHAPTER VII.

### ON IRRITATION OF THE MEMBRANOUS AND PROSTATIC PARTS OF THE URETHRA.

Irritation of these parts occasionally end in abscess, 134.—Many cases formerly considered as of diseased prostate, not so, 134.—Cases of irritation from the state of the nerves, 134—from eating oatmeal gruel, 135—from too great acidity in the urine, 136—from inflammation tending to the formation of an abscess, and treatment, 137, 138.—Remarkable case of acute suffering relieved by opium, 138.—Chronic abscess and case, 140—case of D. F., 141-5.

—Treatment, 145.—Subsidence of irritation of the urethra in such cases, 147 —Paralysis partial of the bladder from softening of the spinal marrow, 146. —Case of C. C., 147—Treatment, 147—from an accident, and case, 148.—Retention of urine in females resembling paralysis, the result of hysteria, 149.—Simple irritability of the membranous and prostatic parts, and treatment, 149, 150.—Application of the unguentum argenti nitratis in more severe cases, and general treatment, 150.—Urethra apparently affected by disease of the rectum, 151.—Bladder usually implicated, 151.—State of the urine of great importance, 151.—Healthy characters and appearances of it, 151.—When acid in excess, character of, 151.—Sediments of lithate of ammonia how distinguished from the phosphates, 152.—When the urine contains albumen, 152.—Albuminous deposit distinguishable by appearance from that which consists principally of phosphate of lime, 152—sugar, 153.—When neutral and alkaline, 153.—Excess of urea, 153.—Treatment of lithic acid diathesis, 153.—Diet, purgatives, alkalies, waters of Vichy, 154.—Urine containing the phosphates of ammonia and magnesia, and phosphate of lime, 154—characters of, 154—commonly occurs after accidents to the loins, 154—soon becomes ammoniacal, 154—usually preceded and accompanied by great nervous irritability, 154—treatment, 154—diet, 154—Mercurial and saline purgatives inadmissible, 155—Opium, 155, the mineral acids, etc., 155.

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ON

# THE ANATOMY AND DISEASES

OF THE

# URINARY AND SEXUAL ORGANS.

## CHAPTER I.

### ON THE STRUCTURE OF THE BLADDER.

THE structure and functions of the bladder and urethra in the male, and of the parts connected with them, are of so complicated a nature; that although great attention has been bestowed upon them by many of the ablest anatomists of this and of other countries, there yet remain some points not thoroughly understood, and which are open for investigation.

The continual calls on the bladder in both sexes, from the commencement to the termination of life, under circumstances which are frequently foreign to their natural state; and the double function which the urethra has to perform in man, during a long period of what is often an artificial mode of living, tend constantly to their derangement; and whilst, like every other part of the body, they contain within them the seeds of their decay, which would sooner or later develop themselves in the ordinary course of nature, they are often caused to germinate at a much earlier period, by the irregularities and vicious propensities of man himself.

The diseases to which these parts are liable would be rarely experienced until the middle period of life was passed, if it were not for the indulgences and irregularities which usually prevail in a highly civilized community, and more commonly give rise to them. They are not, however, the less sensibly felt, because they are sometimes merited. They are always, when severe, the source of great anxiety of mind and distress of body, leading gradually to premature decay; and terminating not unfrequently in a protracted and painful dissolution. At an early period, surgery can often afford great and important relief; it can as often prevent further mischief as it can cure that which exists, and is a source of no less satisfaction to the surgeon than of delight and of happiness to the patient. I know of no diseases for the cure of which the gratitude of one man to another is more often and more cordially expressed.

The views I have taken of the anatomy and relative situation of some of the parts concerned in these complaints, differ occasionally from those which are generally entertained; and lead sometimes to different conclusions, both as to the seat and nature of the diseases which affect them, and the proceedings to be adopted for their relief.

The shape of the bladder has been differently described by authors, according as it has appeared to them, under various circumstances of age, of sex, and of disease. It matters not whether it be oval, rounded, flattened, or acuminated; there being in all, certain points of resemblance and of importance which require attention. In the healthy state, it is capable of great extension and of a corresponding contraction. Its structure is apparently membranous, but, on more minute investigation, this is easily divided into several layers, principally composed of muscular fibres connected by cellular tissue. The external covering of the bladder is only partial, and is derived from the peritoneum. If this is removed, the external muscular coat will be exposed, the fibres of which run in a longitudinal direction, admitting readily of separation one from the other, as the bladder is dilated laterally, and from the internal muscular layer beneath it, from which it may be easily reflected in many places. The fibres of the internal muscular layer run more in a spiral, an oval, and a transverse direction; they are best seen from the inside of the bladder; and when it happens to be thickened, they project into the cavity, forming strong bands or cords, covered by the mucous membrane or lining of the bladder, which is of a pale straw colour, and offering nothing remarkable in its appearance. When the bladder is moderately distended in situ, the part which rises up into the abdomen, and which is sometimes of a pyramidal shape, is called its summit; the anterior and posterior portions are more or less flat, the sides or edges are rounded, whilst the upper and posterior part, which is deeper, rounder, and broader than any other, is called its base—the *bas fond* of the French anatomists. The opening, or meatus, through which the urine passes, is the commencement of the neck of the bladder; it is situated at the lower portion of the anterior part, and opens internally almost abruptly, or with a very little depression, but in no way resembling the funnel-like process to be observed in animals. If the bladder be cut across transversely, this opening will be seen resembling a perpendicular slit, although it is sometimes of a rounder form. Beneath it there is a space of a triangular form, evidently whiter and of a more condensed and elastic structure than any other part; the apex of this triangular space, *trigone* of the French, is formed by a slight projection at the very opening of the bladder, called its uvula, or *luette,* whilst the base of the triangle is marked by a strong whitish-coloured band, which passes transversely across from side to side. The ureters open within the two extremities of this band, and from these two another more prominent line or band descends, inclining inwards, so as to meet like the letter Y, the point being inserted into and behind the uvula. The width of the base is about an inch and a quarter from the opening of one ureter to that of the other; and there is about the same distance from the apex of the triangle to the base. The ureters, descending from the kidneys, enter the back part of the bladder obliquely, pass between the longitudinal and spiral layers of fibres, and then proceed obliquely through the spiral or internal layer, to open near the extremities of the base of the triangle above described. The orifices of the ureters are surrounded by a peculiarly condensed and elastic substance which lies beneath the mucous lining of the bladder, and between it and the internal muscular coat. This superadded structure begins at the base of the triangle, inclines inwards as it advances towards the neck of the bladder, forms in a great measure the orifice, appears to be continuous in the passage forwards, and to constitute the elastic membrane of the urethra. The triangular space of the bladder being elastic, yields to a certain extent to any moderately dilating force, from which point it returns to its original state, on the removal of the extending power. The orifice of the ureter is small, and is enlarged with great difficulty and after much suffering during life, on account of the comparatively unyielding nature of the substance in which it is situated. If the ureter itself be much enlarged by the long continued pressure of the urine retained in it, the orifice still remains of its usual size. When a small stone descends from the kidney, it is impelled from behind by the urine, and is forced through by dilating the orifice of the ureter for the time, but then only with much suffering. If the stone is large it sometimes sticks in the orifice, giving rise to continued inconvenience, and to the symptoms of stone in the bladder from sympathy. This is exemplified by a preparation in the Museum of the Royal College of Surgeons. The patient, a gentleman, consulted several surgeons of eminence, was sounded, the stone was detected, and the operation was declared to be necessary, but was deferred for two or three weeks, until he should improve a little in health. This however he did not do, but on the contrary gradually got worse and died. On examination the stone was found sticking in the orifice of the left ureter. If an operation had been done, the stone would probably not have been extracted, its precise situation might not even have been detected. This case shows the propriety and necessity of not only being able to feel a stone *distinctly*, but also to be able to MOVE IT *distinctly*, with the sound before recourse is had to an operation.

The linear bands, descending from the ureter on each side, are composed of a substance partly muscular, partly elastic. They have been called the muscles of the ureters, and are described as inserted, fleshy and tendinous, into the prostate gland. They appear to be inserted fibrous into and behind the uvula, but the fibres of the bladder generally vary much with regard to the manner in which they pass over or are inserted into the prostate; and I have no doubt that some fibres may be found passing into the posterior edge of the gland, as has been stated by Sir C. Bell. It has been hitherto presumed that the ureters have no valves at their orifices to prevent the reflux of urine into them after it has passed into the bladder, such an apparatus being unnecessary in consequence of the oblique manner in which they enter between the muscular layers of the bladder, which compress and close them when it is distended, so as to prevent a reflux from taking place. It appears to me that this mechanism is intended for the very reverse object. The ureter opens on a peculiarly condensed structure, in order that the orifice may be constantly patulous; and the obliquity of its passage through and between the muscular coats of the bladder, is for the purpose of giving facility to its being pressed upon and closed when the viscus is in a distended state, in order to delay if not to prevent the further flow of urine into it from the kidney. When the bladder is contracted and empty, the urine passes readily into and gradually dilates it, until the desire for expulsion comes on and leads to its evacuation. A little more or a little less seems to have no influence in preventing the urine from finding its way in, the weight of the column descending from the kidney readily overbalancing to a certain point the resisting power of the coats of the bladder. When the bladder is distended, it no longer yields easily, the ureter is pressed upon by the muscular wall in its passage through it, and the further entrance of urine is in a great measure prevented. If the obstruction be long continued, the ureter above this part is gradually dilated from the size of a crow quill to that of a man's thumb, and even larger; the pelvis of the kidney increases in size, a low or chronic inflammation is induced, the secretory organs are pressed upon and partially removed, so that the kidney may become at last an almost empty bag separated by partitions, indicating only the former existence of its lobes. A total suppression of the secretion may, under such circumstances, take place at any time. The most remarkable example of the kind which has come under my observation, occurred in the case of a lady who suffered from a cancer of the uterus; the disease after a time extended towards the ureters, which at last were embraced and pressed upon by it as they entered the bladder. The lady, as this took place, began to suffer more from derangement in her urinary apparatus; the bladder was found ultimately, on passing the catheter, to contain little or no water; she fell into a state of low fever, became paralytic, afterwards comatose, and died. On examination, the orifices of the ureters were found in a sound state, although the ureters were impervious at the part where they were grasped by the diseased structure; above this they were greatly enlarged, and the kidneys were much diseased and sacculated. The peculiar manner in which the ureters enter into the bladder is, then, an admirable provision of nature for the purpose of preventing too great a distension of the bladder rather than of the ureters, for nature can accommodate herself for several days to a complete suppression of the secretion of urine, and for a very long time to a partial secretion of it. The natural quantity usually secreted varies from two pints to two and a half in the twenty-four hours, and when an obstruction takes place preventing its evacuation, the bladder may become considerably distended; but the same quantity will not be secreted during the second twenty-four hours as in the first, and there will be still less during the third, before which time relief ought to be given by operative means, if it should not occur otherwise. This provision of nature is therefore intended, I apprehend, to protect as far as possible the bladder and urethra, rather than the constitution of the patient; the bladder and urethra being more susceptible of mischief in a shorter time than the system at large. I am disposed to believe that the two bands on the triangular space, called the muscles of the ureters, are better fitted for keeping the part fixed, and for strengthening and raising it up when necessary, than for keeping open, and in a straight line, the channel of the ureters.

The triangular space is highly sensible, the nerves being directed to, and communicating more particularly on it, as they descend on each side, from the inferior mesenteric and the hypogastric plexus, and from the third and fourth sacral nerves. It is therefore very excitable, and, when irritated, gives rise to the desire to evacuate the bladder, as well as sometimes to very great pain, as all have experienced who have suffered from stone in this viscus. The idea entertained by some surgeons, that a bougie touches this part on entering the bladder, and in this manner gives rise to the desire which is usually experienced to pass the urine, is certainly erroneous; for when a healthy bladder contains a moderate quantity of fluid, a bougie can only touch the very apex of this space on its entrance into the bladder; and observation has led me to believe that this desire takes place rather at an earlier period, when the instrument has entered that part of the urethra which is surrounded by the prostate. In a healthy state of the bladder it enlarges considerably downwards towards the rectum when moderately distended, and the triangular space descends, rendering it impossible for a bougie to touch more than the apex of the triangle, unless it be curved backwards at the extremity. This descent of the triangular space can scarcely however take place, except when the bladder is in a healthy state; for when it becomes much thickened from disease it loses its capability for dilatation, and cannot contain a sufficient quantity of water to render this a descending or protruding part. The triangular space, or trigone, rests on the rectum, and the bladder is punctured through it when that operation is done; but which I do not recommend to your attention, believing that it ought to be superseded in almost every case by others, which will be noticed in their proper places. The operation of puncturing the bladder through the rectum was founded on the supposed anatomical fact, that the triangular space rested on, and closely adhered to the rectum, so that the urine would flow directly from one part into the other, without escaping into the neighbouring structures. The peritoneum, however, instead of passing down behind the bladder, and between it and the rectum to the base of the triangular space, and there terminating in a cul de sac, does sometimes pass on further, between the triangular space and the rectum, and even occasionally as far forwards as the prostate gland; so that by puncturing through the rectum, the general cavity of the peritoneum will be opened in such cases before the bladder is penetrated, and the patient must be lost, from the urine finding its way into the peritoneal cavity, and giving rise to an inflammation which has always been destructive whenever this kind of effusion has taken place, and from whatever cause. I am not aware of there being any signs by which this conformation can or cannot be distinguished, and consequently the safety of the patient depends not on the knowledge and ability of the surgeon, but on the fortunate, although the more usual formation of the part on which the operation is performed.

The corresponding portion of the bladder, on its anterior part, is in a similar, although more certain manner devoid of peritoneum, and has been made the subject of an operation by puncture above the pubes. This operation is altogether objectionable, except in some few cases of enlarged prostate, and is rarely to be preferred when an operation is absolutely required to give relief.

Posterior to the base of the triangular space the coats of the bladder are usually thin, although the transverse bands of muscular fibres are more strongly marked, passing across like strong distinct cords, and sometimes running in an oval direction. The greater thinness of the bladder and the direction of its fibres admit of a hollow being formed at this part, in which a stone may lie, and remain sometimes undiscovered on sounding for it. I have a bladder, in which this hollow is well marked, and fifty small stones were found in it after death. This hollow is always a portion of the general cavity of the bladder, and is a very distinct thing from certain pouches formed occasionally in it, and which sometimes attain to a large size. I have a bladder with five pouches in it, of different dimensions, all communicating with the common cavity by small openings, which is their distinctive character. These pouches occur much more frequently than is commonly supposed, and cause great inconvenience. In the Museum of the Royal College of Surgeons there are several very fine preparations, in which they are remarkably large, equalling the size of the bladder itself.

The longitudinal muscular coat of the bladder is composed of a layer of fibres, which have in some parts little lateral connexion with each other, and are consequently capable of easy separation. If this layer of fibres be dissected off, commencing from the centre of the fore part of the prostate to the summit of the bladder, turning each portion outwards to the right and left, it will be seen that it passes over the prostate, and is not confined to the bladder alone. The fibres descending from the top and sides of the summit, sweep by the ureters, becoming more compact and firm as they proceed, and in many cases some are reflected back upon the ureters, fixing and steadying them in their places. They then lie upon the sides of the prostate, being partly inserted into it and into a tendon, which they form on the fore part, and which is usually double, one proceeding from each side. These tendons are in connexion on their upper part with the pelvic fascia, and are commonly termed the *inferior ligaments of the bladder*, and by the French, the *pubio prostatic ligaments.* In some instances there is but one tendon in the centre, and the fibres from each side converge, and are inserted into it. In general there are two, but the number is uncertain; there are sometimes three, and even more; be they however more or less, they run on to be inserted into the pubes near its symphisis. If the attachment which the pelvic fascia descending from the pubes has with them be dissected off, some fibres will often be seen arising from them a little anterior to the prostate, and running backwards and downwards in a radiated form, to the fore part and sides of the prostate gland. These are the fibres which modern French anatomists, particularly Blandin, depict in this situation; and they are, I presume, the anterior compressors of the prostate of Winslow, mentioned also by British anatomists, but not shown in their engravings of these parts. The longitudinal fibres of the bladder cannot embrace the back part of the prostate, on account of the vesiculæ seminales, which would interfere with their continuance in this direction; they are, therefore, inserted into a sort of tendinous line, short of, but attached to its posterior part, beneath the uvula of the neck of the bladder. They do not, however, always terminate at this part, for sometimes a strong band of muscular fibres is seen going into the prostate; and is found terminating and apparently inserted into the verumontanum with the ejaculatory ducts, which they appear to surround. Messrs. Taylor,* Bedford,† and Hancock,‡ when students at the hospital, made many attempts with me to discover circular fibres around the neck of the bladder, but we did not succeed satisfactorily, so as to show any of importance. We found occasionally, but not always, some transverse fibres, crossing directly over the opening from the bladder into the urethra. I am therefore of opinion, that the portion of the bladder surrounding the opening into the urethra posseses but little muscular contractility, whilst it is endowed with a singular degree of elasticity, which may be easily demonstrated by stretching the part. When the two muscular layers of the bladder contract, its tendons inserted into the pubes become with the prostate generally fixed points; the urine is forced against the orifice of the urethra, which yields by its elasticity, and returns to its former state when the pressure is removed. I am aware that in certain paralytic states of the bladder the urine may be made to flow by pressing on the abdomen immediately over it, which cannot be done in a healthy person, and this would seem to imply that a muscular power was the cause of the urine being retained; although, on the other hand, the urine is retained and collected in considerable quantity in some paralytic cases without making its escape when assisted by the erect position; implying that there is also an elastic power acting at the neck of the bladder. That fibres have been described surrounding this part is undoubted, but no anatomist has dissected them in such manner as to admit of their being truly called a sphincter muscle, although that is the name given to them. It is however possible that this part may be both muscular and elastic; and I am willing to take that view of it.

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† Surgeon to the Hospital, Hobart Town, Van Dieman's Land.

‡ Surgeon to the Charing Cross Hospital.

It is of very little consequence, whether it be decided that the part surrounding the orifice of the bladder is acted upon by a structure entirely muscular, or entirely elastic, or partly both; but the fact of there being an elastic structure at the part is of great importance, because it enables us to account for the occurrence of certain diseases in a more satisfactory manner than formerly. It enables us to take other views even of these diseases, and to adopt new modes of practice, which will be found more beneficial in aid of our suffering fellow-creatures than those which are commonly recommended.

I shall always allude to the neck of the bladder, as the small part surrounding the opening into the urethra, and which therefore is a ring, a little broader or thicker than the bladder itself; on the under part of which the uvula is situated, the urethra being before, the bladder behind it. The abruptness with which the opening commences, when viewed from within, appears to warrant the acceptation of the term, whilst the diseases which affect this part render it worthy of an accurate definition. When it loses the natural elasticity with which it is endowed, which it does from internal changes the consequence of disease, it becomes firm and contracted, constituting a structure resembling in many respects that which often takes place in the urethra. In common language among unprofessional persons, a stricture at the neck of the bladder is often said to exist; but gentlemen know nothing of the exact situation of internal parts, and suppose that an obstacle at six inches distance from the orifice of the urethra must be at the neck of the bladder, when is not within two inches of it. If you refer to surgical authorities on this subject, you will find it I believe generally stated, that stricture does not take place beyond seven inches, or the membranous portion of the urethra; and all the derangements which occur beyond that part, are attributed to disease of the prostate. This is however a very great mistake; the prostate gland is by no means so often in fault as has been presumed; and no greater error has been committed in surgery, than that which supposes the third lobe as it is erroneously called of the prostate, to be the cause of those difficulties in making water which occur so frequently in elderly people, and sometimes in young ones. I am well aware that a portion of the prostate does enlarge and project into the bladder, preventing the flow of urine from it; but I mean to affirm that this evil frequently takes place, and is more effectually caused by disease of the neck of the bladder, totally unconnected with the prostate, than by disease of that part. A fact I consider exceedingly important, because it leads to improvement in this branch of surgery, and to the introduction of more effective means of cure.

The prostate gland is a substance of a tolerably firm consistence, and of a whitish grey colour, placed in immediate connexion with the orifice of the bladder, and nearly surrounding the first portion of the urethra. It is in the healthy state about fifteen lines in length; and has been compared in shape to the ace of hearts, or to a flattened chesnut, the base being turned towards the bladder, the apex forwards towards the urethra. When it is divided longitudinally, that is by an incision made through the bladder and urethra, the greatest portion will be perceived to be below the urethra, although this is not invariably the case. When the smaller or upper portion of the prostate only is divided, and there is sometimes but little or even none above the urethra at this part, and the neck of the bladder is laid open, a strong raised white line is seen running from the uvula vesicæ, in the centre of the under part of the canal, having from its being elevated a slight hollow on each side of it; this line, as it proceeds, assists in forming an oblong body nearer to the apex of the prostate than to the bladder, called verumontanum, and from its resemblance to a cock's comb the caput gallinaginis. From the base of this elevation the white line runs again forwards, and becomes indistinct in the bulbous portion of the urethra. It appears to strengthen these parts, and connect them more intimately with each other.

The ejaculatory ducts from the testes open one on each side of this little elevation, which is composed principally of the mucous lining of the urethra; on its upper part there is a lacuna or hollow called the sinus pocularis, which is sometimes so large as to admit the end of a small bougie to enter, but over which a rounder and larger pointed instrument passes readily, demonstrating to the surgeon the nature of the obstruction, and preventing a repetition of the accident which may be always suspected when a difficulty occurs at this part. This circumstance is not of common occurrence, for a small bougie generally passes over, or rather by the side of the sinus pocularis, without being entangled in it; and it is probable that the white line I have alluded to, by making a slight elevation in the middle, directs the instrument into one of the hollows on either side of it. On the floor of the urethra, by the side of the verumontanum, the ducts of the prostate open generally about eight in number on each side, arranged in the form of a crescent; they are sometimes more numerous, communicate with each other before they open into the urethra, and have been enumerated as high as from thirty to forty. They are ducts leading from follicular glands, situated in the substance of the prostate, and are best shown by squeezing the recent part, when the secretion flows through them. The widest part of the gland is from side to side, there being nine lines from the centre of the urethra to its external surface in a well-formed prostate; but if the incision be not made transversely, but diagonally outwards and downwards, it is a little more. A fact of importance to recollect in performing the operation for the stone.

The prostate in the fœtus is composed of two parts, each part consisting of two lobes, on which account perhaps it was, that the older anatomists called them prostates, in the plural number. Between the fourth and fifth month before birth, the two internal lobes unite, and the gland is then composed of three parts; but these again, betwixt the sixth and the eighth month, lose their separate form and become one substance. The base of the gland, or the part by which it is applied to the bladder, is notched or deficient in the middle, and particularly at the under part, where it is much flattened, and in the median line depressed, which together with the passage of the urethra through it, seem to divide it into two lobes. A little below where the notch terminates, the ducts from the testes and vesiculæ seminales enter; but they do so by perforating the gland at a part which is a little hollowed out, and not by passing between the lobes to reach the side of the verumontanum. The portion of the gland nearer to the bladder than the ducts, forms a sort of bar or connexion between the two lateral portions, and this part sometimes takes on different forms. There is not more than one preparation in eighteen in which it is rounded like a little nipple, but it sometimes does assume this form; and Sir E. Home thought it right, from this not usual appearance, to term it a third lobe. It was well known to previous anatomists: Mr. Hunter had not only described it in disease, but had a drawing made of it, which is now No. 123, fig. 1 and 2, in cube 4, drawer 8, in the Museum of the College of Surgeons; and which drawing Sir E. Home had engraved.

The prostate is applied above and to the sides of the neck of the bladder, but is generally wanting at the under part, unless the bar uniting the lateral lobes, or as it is termed the third lobe, is unusually large. The under portion of the neck of the bladder is not then always surrounded by the prostate; and the uvula vesicæ, the luette or crête vesicale of the French, is not necessarily connected with its third lobe, or with any other part of it. On the fore parts and sides, the outer or longitudinal fibres of the bladder pass over the prostate; on the under part they generally stop short of it, but sometimes perforate its under surface. The middle layer and the elastic or superadded structure appear to be attached to it; whilst the mucous coat, which possesses no peculiar properties, seems only to be connected with it through the medium of the cellular texture uniting it with the subjacent parts.

There is a preparation in my collection which shows in an especial manner the elastic structure at the neck of the bladder diseased, without any affection of the prostate, and particularly of the third lobe, for which it has usually been mistaken. The patient passed his water with great difficulty, in consequence of the barrier formed by this unyielding structure, and died ultimately of the disease after much suffering. I have since met with other and similar cases, and it appears to me that the following conclusions may be deduced from the preceding statements:—

1. That an elastic structure exists at the neck of the bladder, and may be diseased without any necessary connexion with the prostate gland.

2. That the prostate may be diseased without any necessary connexion with the elastic structure.

In another preparation, the right lobe of the prostate is seen of more than twice its natural size; the left is a little larger than usual. When the bladder was opened, the orifice into the urethra was found dilated to the size of the end of the little finger, and perfectly round at its upper half; but this opening was nearly closed by the enlarged right lobe of the prostate which lay in front of it, and pushed the urethra to the left, whilst it had drawn up the mucous membrane of the bladder so as to form a bar across its under part. This bar is quite membranous, and does not include the elastic structure which is not diseased, neither is that part called the third lobe, nor is there any projection into the bladder, save the bar or valve formed by its mucous membrane at the very meatus. This patient was eighty years of age, had passed his urine with much straining long previously to the last attack, which came on a few days before he died. The catheter was passed with considerable difficulty, and he sunk under the irritation induced constitutionally. The bladder is very large and but little thickened, the transverse bands on the back part are particularly isolated and strong. In the oval hollow behind the triangular space there were eighty small stones.

In this case the disease was exactly the reverse of the other; the prostate was alone affected, and the bar formed at the neck of the bladder consisted of its mucous membrane, elevated and drawn tight across the under part of the opening, in consequence of its connexion with the prostate through the subjacent parts. If the prostate could have been removed, the mucous membrane forming the bar would have fallen back into its proper place. If this bar had been divided, which would now be done without suffering or difficulty, a great obstruction to the flow of urine would have been removed, and a proportionate relief obtained. When there is a third lobe of the prostate, and it is diseased and projects into the bladder, the elastic structure of this part usually partakes of the evil, forms a hard firm bank in addition to the nipple-like valve, and between them the retention of urine may become complete. This complication of disease is much less curable than the disease of the neck of the bladder alone; and the necessity for a distinction between them is so much the greater, believing as I do, that relief from this latter complaint is always in the hands of a surgeon.

In the simple or first stage of the disease of the elastic structure of the neck of the bladder, when there is only a defect of elasticity, it gives rise to stricture at the orifice, curable by common means, if properly applied. In its second stage, when the bar is formed and becomes more or less rigid, a small bougie rests against it, and if made of soft materials bends, and cannot be made to proceed; if a solid instrument should be used, it passes in one of the hollows on each side of the white central line, which are also deepened by the elevation of the uvula vesicæ, catches on the valve at the entrance, and when the handle of the instrument is depressed, it raises it, bladder, rectum and all, upon its point, until the pain or the resistance induces the surgeon to forego the depression, or the point slips off into the bladder, or the valve yields or is torn, and the obstacle is thus in part removed. If the surgeon should not have acquired much experience, he may rest satisfied with the distance the instrument has gone in, and suppose he has passed it into the bladder. A gentleman came from America to put himself under my care, under these circumstances. He had never passed his bougie beyond the neck of the bladder, although he and his surgeon supposed they had done so. When I succeeded in doing it, he became sensible of the difference; and I desired him, on his taking leave, always to use in future a long No. 12 catheter with a very round point, that the passage of urine through it might convince him of the fact of its being in the bladder.

When the disease reaches its third stage, or that which gives rise to considerable difficulty and straining to pass water, and which cannot always be effected, many serious symptoms arise. Two of these I cannot refrain from noticing here, because they have not, I believe, received the attention they merit, if indeed they have not been in some degree disregarded, or even overlooked, and that they are dependent on changes which have taken place in the natural structure of the parts.

When describing the structure of the bladder, I alluded to the distinct manner in which the longitudinal and transverse fibres pass across each other at right angles, leaving small intervening spaces, filled up only by the mucous membrane and the cellular tissue by which they are united to each other. When the elastic neck does not yield to the natural degree of pressure usually exercised by the coats of the bladder, in consequence of its being the seat of commencing disease, the transverse and longitudinal fibres are called upon to act with a greater degree of vigour; and in certain cases during this augmented action, the mucous coat becomes distended by the urine, yields, and protrudes externally between these muscular fibres. The commencement of an extra vesical pouch is thus formed, which goes on increasing, if the same cause continues which gave rise to it, until it attains considerable magnitude: the opening between the muscular fibres by which it began is usually of a small size, leading to a large cavity, into which a stone may pass, and be fortunately shut up so as to give rise to no further inconvenience, and to the belief that the stone has been dissolved or passed. In other instances, the opening may be so large and in such a situation as to admit of the stone being struck by the point of the sound, although it will not be readily discovered or extracted after the operation for its removal has been accomplished. In all cases a quantity of urine may and will be received in these pouches, and various secretions may be poured into and retained in them. In some cases of this kind, after drawing off the urine by the catheter, and as I supposed emptying the bladder, I found I could still get more by passing the instrument in a certain direction, and in all probability into one of the pouches which had been thus formed. This is however an accidental circumstance, not commonly met with. If the bladder be emptied by the catheter in the erect position, and the patient be made to change it by lying down, retaining the catheter in its place, an additional quantity may run from the instrument, showing that one or other of these pouches has been emptied. A gentleman consulted me on account of a difficulty he had in passing his water, for which he used an elastic catheter twice a-day and sometimes thrice, with great relief. The symptom he complained of as most, disagreeable was, that after emptying his bladder in the erect position before going to bed, he soon after felt the desire to make water return, and on straining forcibly he could pass a small quantity. I desired him to use the catheter a second time when he felt this uneasiness, which he did, and obtained about three ounces more water. This led to the belief that he had pouches in his bladder, which were only emptied by change of position. I wished him to ascertain what position emptied them; but he could not do this in a satisfactory manner, for a reason which appeared after death, namely, that there were several pouches, which could not all be emptied by the same position. He obtained, however, considerable relief by first drawing off his water in the erect position, and then by lying down with the catheter in the bladder, and by changing his position from either side to his face (for these pouches rarely form on the fore part) he removed a further quantity; after which he obtained rest, until the pouches and the bladder were refilled, and the desire to discharge his water again became considerable. In another gentleman, the existence of one or more pouches of this kind became evident on injecting the bladder; twelve ounces of warm water could be thrown into it before much uneasiness was produced; but on drawing it off, ten ounces only could be obtained, and rarely the whole twelve even by any change of position. In this case there were five pouches, of different sizes; and there was also a peculiar symptom, which I had then met with in three others, without being able to account for it, and which may have depended on the same cause in all.

The first instance occurred in the York Hospital at Chelsea, in the year 1816. The patient, a soldier, had been invalided for some complaints of his urinary organs, of which a stricture formed one. The removal of this did not much alleviate his symptoms; and on examination with the catheter, a smart blow was felt on the instrument coeval with the termination of the flow of urine, giving rise to the idea of a stone. This always took place, and sometimes the stroke seemed to be repeated twice, or even three times, although each time fainter than before. The first blow would sometimes force the catheter when slightly held, from between the finger and thumb, at least two inches out of the urethra. Many able surgeons saw this case; several thought there was a stone in the bladder, and some even advised an operation. The blow was however deficient in the sound which a solid, hard substance gives, the *tick* as it is often called technically. The substance causing it could never be detected by the most careful examination, after the urine had been evacuated, nor while the bladder was full, but only at the moment of its becoming empty; and I was led to the conclusion, that if there was a stone in the bladder, it must be enclosed in a sac, and that it was the soft envelope which rendered the sensation communicated by it so obscure. The man was discharged.

In the second and third cases the sensations were the same, save that the little taps on the catheter resembled more the blows given by the wings of a bird in fluttering, so that I have been in the habit of calling them the *fluttering strokes of the bladder* in my Lectures, believing that they depended on some unusual or irregular action of the oval cavity of the fundus, or of the base of the triangular space. The last case cleared up the difficulty. The blow resembled that from a stone; although the grate which a stone gives, or ought to give, to either a silver, a steel, or a gum elastic catheter, was wanting, and the blow was never felt except when the last drops of urine were flowing, at which time the silver catheter often received so smart a shock, that it was forced out of the bladder and from between the fingers, so that the patient himself could not help observing it, and asking the cause. I was never satisfied during his life that there was not an encysted stone in the bladder, although I was quite sure there was not a loose one. The examination after death decided the point; there was not a stone of any kind, and nothing peculiar save several pouches, and a bar at the neck of the bladder, formed from its elastic, but now rigid substance, totally unconnected with the third or middle lobe of the prostate. The peculiar fluttering strokes of the bladder on the catheter, were caused, I have no doubt, by the pouches containing urine being propelled against the instrument by the muscular efforts of the bladder on the evacuation of the last drops of urine from its cavity.

When symptoms have given rise to the suspicion of the existence of a stone, and especially from these fluttering strokes or blows on the instrument having been felt, it may have happened that an operation has been performed for its removal and no stone has been found. The preceding observations will prevent such a misfortune from occurring in future; for although it is said that in such cases the patients when they survived were much the better for the operation, I am satisfied that the good done by it was caused by the division of the bar at the neck of the bladder, and the consequent removal of the obstruction to the passage of the urine.

It is usually said, that the female has not a prostate, but merely an erectile tissue surrounding the neck of the bladder. If the word prostate be used with reference to its derivation, as standing before the vesiculæ seminales, certainly a woman has not a prostate, because she has no vesiculæ seminales; but if it be used as a substantive word, to express a particular thing, in the same manner as the words arteria innominata are now used as a name for a particular artery, which formerly had no name; then a female has a prostate, or a substance of the same shape, form, and nearly of a similar structure, surrounding the commencement of her urethra. It is as large as the prostate in a boy before the age of puberty, and resembles very nearly in external appearance the same part in the male. The ejaculatory ducts of the male, opening into the urethra, are of course wanting, and there do not appear to be any proper ducts of the part itself, so that this substance may be considered in the female to be destitute of the follicular structure, which gives the additional bulk to the male prostate.

The fibres of the bladder have the same arrangement in the female as in the male. The prostate gland in the male has at least three offices: *viz.* 1, to stand before the orifice of the bladder, to give support to it and the urethra which it surrounds, and a point more or less fixed, upon which it may act in expelling the urine; 2, to secrete a fluid peculiar to itself; and 3, to receive the ducts conveying secretions from other parts: which two latter uses cannot be attributed to it in the female, and the want of which may account for the difference of size in this part, in the two sexes. Cowper, who was well acquainted with this substance in the female, calls it corpus globosum.

De Graaf, in his Work de Mulierum Organis (page 323), has the following passage bearing on this subject. " Sed ulterius, inquiret aliquis, unde illi ductus sive lacunæ humorem illum hauriant? priores, illæ scilicet, quo circa colli orificium et meatus urinarii exitum conspiciuntur, ex *parastatis mulierum* seu potius crasso et membranoso corpore circumcirca meatum urinarium existente humorem suum accipiunt; posteriores verò ex nervoso-membranosâ colli uterini substantiâ liquorem suum colligant."

# CHAPTER II.

## ON THE STRUCTURE OF THE URETHRA.

Anterior to the prostate, the urethra is termed membranous for the space of about or rather less than an inch, being the part between it and the bulb, and the portion which passes under the pubes, and the subpubic ligament, and through that part of the deep perineal fascia attached to it, which together form the triangular ligament of Camper. The bulb of the urethra lies in front, and in connexion with this fascia, the membranous part of the urethra to which I am alluding is behind the ligament. It was called membranous from the thinness of its proper coats when deprived of its usual coverings; for this part, although thin, has always been known to be surrounded by muscular fibres as a probable compensation; and the older anatomists, such as Winslow, Bartholin, Santorini, Gerardi, and others, conjectured that they were capable of acting as a sphincter to the bladder, although situated thus anterior to it. The ideas of these anatomists, both as to the situation, structure, and functions of these muscular fibres, did not receive the consideration they deserved, and in abandoning the idea of these fibres acting as a sphincter, modern anatomists seem to have attended but little to the subject.

Mr. Wilson, in the first volume of the Transactions of the Medical and Chirurgical Society of London, gave a particular description of two muscles surrounding the membranous portion of the urethra, which attracted the attention of every anatomist in Europe. They have been acknowledged by all, although none have described them in so precise and apparently accurate a manner as he has done. It is however a very curious circumstance, that Mr. Wilson only described half of them, and that the error should not have been detected until the present time. He pointed out the close connexion between them and the levator ani of each side, which induced many anatomists to think they were only a part of these muscles, and that distinguishing them separately was after all an act of unnecessary minuteness. The error Mr. Wilson fell into arose from the circumstance of his examining these parts from a side view, made usually from the left. If he had dissected from behind forwards, he must have discovered the whole of the muscle of which he described only a part. Desirous of having preparations to show at my Lectures, which should enable me to demonstrate all these parts in the clearest manner, I employed Mr. Taylor, then my assistant, now Surgeon 29th Regiment, to make this particular dissection. He could not however succeed to my satisfaction; the muscle was never perfect, according to Mr. Wilson's description of it. On one occasion, dissecting from behind forwards, and not by a side view, he made out an attachment on the left side, formed by some fibres running from near the junction of the ramus of the pubis and ischium to the membranous part of the urethra: this I supposed to be an accidental occurrence; but on further careful investigation by Mr. Taylor, Mr. Bedford, and myself, the muscle was obtained in its complete state. It entirely surrounds the membranous part of the urethra. On the upper part there is a central median line of tendon, one half of which runs backward to be inserted into the fascia covering the upper surface of the prostate; the other half passes forwards on the urethra, through the triangular ligament to be inserted in front of it, near the union of the corpora cavernosa. On the under part there is a similar tendinous line, which is attached backwards to the fascia underneath the apex of the prostate, and forwards to the central tendinous point in the perineum. The muscle on its upper surface is covered by fascia descending from the pubes, which adheres to it; and this I presume to be what Mr. Wilson described as the tendinous origin of his muscle, and from which he supposed the fibres descended to surround the urethra. From the median tendinous line in the upper part of the urethra the fibres pass outwards on each side, converging as they proceed, so as to form a leg, as I term it, of muscular fibres. On the under surface the same thing takes place; and a leg on each side being thus formed from the superior and inferior fibres running from each half of the urethra, they unite and pass outwardly, that is transversely across the perineum, to be inserted into the ascending ramus of the ischium, near its junction with the descending ramus of the pubis on each side.

The muscle with its origins, one on each side, is inclosed between the two layers of fascia forming what is commonly called the deep perineal fascia. When the anterior layer is turned down from the triangular ligament and the pubes, the muscle is seen lying between the anterior and posterior layers of the fascia. The pudic artery runs in front of it, dividing into the arteries of the corpus cavernosum and of the dorsum of the penis. Cowper's gland on each side lies below the muscle, and seems to be enveloped by the fascia. The posterior layer of the deep fascia passing on the inside of the muscle reaches the inner edge of the levator ani, round which it turns to invest the urethra and prostate; so that this fascia separates these two muscles, the fibres of which also run in different directions. This may be very distinctly seen, and it is manifest that the muscle is enclosed between the layers of fascia, which has been, I presume, the reason why it escaped the observation of the many very good anatomists who investigated these parts.

The same muscle or muscles are seen in the female, proving therefore by their existence that they are not for sexual purposes, and that the opinions of Mr. Wilson and Sir Everard Home, who believed them to be so, were erroneous; whilst there can be no doubt of their being intimately and essentially connected with the due retention and transmission of the urine. When the muscle acts, which it must do, from its origins from the rami of the pubes and ischia, it can compress the urethra so as to close it completely, after the manner of a sphincter. It has a singular resemblance to the accelerator urinæ, situated outside the fascia, and is capable of acting, I am led to conclude, with great energy. The preparations, showing all these parts, are preserved in the Museum of the Ophthalmic Hospital, Charing Cross.

The urethra is termed membranous at the part where it is surrounded by the muscle I have described, and whilst it is posterior to the triangular ligament. On passing through the ligament it obtains the name of the bulbous part or portion, in consequence of the bulb of the spongy body of the urethra being attached to and enveloping it below.

The urethra, after passing through the triangular ligament, is attached to it and maintained in its place by a layer of fibrous structure, which the ligament sends forward to surround and support it. The bulb of the corpus spongiosum is applied to the urethra on the under, but not on the upper part; and the bulb is again retained and fixed in its situation by the acceleratores urinæ muscles which lie below it in the erect position. These muscles do not appear to me to be usually described with the accuracy they deserve. They arise on each side, sometimes by a small pointed triangular tendon from that part of the ramus of each os pubis, which is near the ischium. When this tendon does not exist, they arise from the triangular ligament by fibres, which pass with it to the same part of the pubes; they are also firmly implanted inwards around the bulb. From this origin of the muscles on each side of the bulb, the lowest fibres pass downwards to cover its inferior part; those arising higher up pass directly across; and those still higher up ascend, diverging as it were from their point of origin. The fibres of each side are seen to meet in a white central line, lying on the surface of the bulb, passing downwards to assist in forming the central point of insertion of all the muscles of the perineum, and running upwards on the urethra to a point where the muscular fibres on each side diverge from the urethra, and pass outwardly, with the object of running on the ligamentous covering of the corpus cavernosum of each side to their ultimate attachment to that part. This muscle is not only a compressor of the bulb, but of the urethra immediately in front of it, which it surrounds by tendon on the upper half, and by muscle on the under half, the corpus spongiosum being interposed. If an incision is made in the line of union of the two muscles, and they are then turned outwards, the manner in which the remaining portion of this muscle is formed will be distinctly seen in the shape of a flat tendinous expansion, which passes over the urethra from side to side to join the muscular part below, and thus complete the circle around it. This tendinous part of the accelerator muscles which surrounds the urethra supports it until it is received into the sulcus formed by the two corpora cavernosa, the ligament connecting these parts together being firmly attached to the pubes. The passage of the urethra from the opening in the triangular ligament is then a gradual ascent to the point where the penis begins to become pendulous, when the urethra descends suddenly with it, and the line or curve separating the ascending from the descending or pendulous part is more distinctly formed than is usually supposed, by the attachment to the under part of the pubes, of the common suspensory ligament of the penis. If these points of attachment be attended to, the passage of instruments into the bladder, be they straight or curved, is, in a healthy state of parts, a very simple operation. They are guides also, demonstrating the respective places at which the point of the instrument has arrived, and the course which it ought to take to attain its object; rendering therefore any computation of the length of the urethra useless as a guide in practice, although otherwise an object of curiosity. I have in my possession urethræ from eight to eleven inches long, and several of intermediate lengths, depending principally on the pendulous portion for the difference. I place no reliance however on the measurement of the urethra after death, for although the urethra may be eleven inches long, I have never met with a case, unless there were a diseased prostate, in which a catheter ten inches long was required to draw off the water: on the contrary, one of eight inches in length will generally be found sufficient; and I have known one of seven answer well. The additional inches are usually gained by the elongation or stretching of the parts after death; and if a surgeon should calculate by inches as his instrument proceeds, instead of considering the points of attachment as so many landmarks to guide his progress, he will be frequently in error, and always liable to do mischief. The mistake of most consequence takes place in regard to those two parts which are called *membranous* and *prostatic*. The usual length of the prostatic portion is about fifteen lines, the membranous about twelve; or something more than an inch for the prostatic portion, and perhaps a little less than an inch for the membranous. In the urethra, which is eleven inches long, these two parts are three inches in length. But I have no doubt that a catheter nine inches long would easily have drawn off the urine during life. I am satisfied that one of eight inches would have done it; and the membranous and prostatic portions, which when dissected appear to be near three inches in length, would have been cleared during life by an instrument very little more than two; and this would have occurred from the manner in which these parts are supported and maintained against the pubes by the fasciæ, which attach and connect them and the surrounding parts to each other. When the prostate is diseased, the urethra at this part undergoes a considerable degree of elongation, and a catheter under such circumstances should be from twelve to fourteen inches long, and larger in the curve.

The length of the spongy portion of the urethra must always be uncertain, and is of no consequence. The orifice of the urethra when in a normal state is always vertical, and closed, the sides being applied to each other.

In addition to the excretory ducts to be found in the prostatic part, two from Cowper's glands open into the bulbous portion. These glands are two small granular bodies, lying close, but posterior, to the bulb. The ducts pass upwards and forwards for something more than an inch, opening in general on the under surface of the urethra, by orifices so small that they can rarely be seen, except by squeezing the secretion through them. They appear to be sexual glands, and not connected with the excretion of urine, inasmuch as they are to be found in the female, opening into the vagina instead of the urethra. Many other openings from secreting surfaces are to be found in the urethra; generally in the median line on the under surface, and are called *lacunæ,* although some are to be found on the upper surface, and one larger than the rest is called the *lacuna magna.* It is usually situated something more than an inch from the orifice of the urethra, and is often nearer two. The orifices of all these lacunæ are turned forwards, and may catch the point of a small bougie; the lacuna magna, from having more often done this, has obtained its name of *magna,* rather perhaps than from its size; and when this occurs the bougie must be withdrawn a little and the point borne against the inferior portion of the urethra, against that part situated just before where it enters into the glans penis, and which is called *fossa navicularis,* not that any distinct fossa can be shown. There is a follicle here which is apt to become inflamed, and give a great deal of trouble in many cases of gonorrhœa; and when its excretory duct becomes closed or impervious, which it sometimes does, it enlarges, the inflammation is communicated to the prepuce, into, or between the layers of which, the matter formed in the follicle is discharged. This is followed by abscess in the prepuce, and the formation of one or more small openings upon its edge, which on the subsidence of the inflammation become sinuses, leading from the edge of the prepuce to the follicle, which will be found below and behind the frænum, and through which a drop or two of urine will often distil. The division of the outer fold or layer of the prepuce usually allows of a cure being effected; but I have had to divide both layers, and the treatment of the inside of the exposed follicle, so as to avoid enlarging the opening which already exists into the urethra, or to refrain from causing one is often a point requiring great care and attention; for when the ulceration extends and a hole is formed in the urethra, it is often found impossible to effect its closure. The prepuce sometimes adheres wholly or in part to the glans, not so much as a natural formation, but from the accoucheur having neglected to examine this part at birth, or after a few days, so that the very fine and delicate skins covering one part, and lining the other, are allowed to coalesce, and give rise to much trouble, and the necessity for a painful operation in after-life for their relief. When in such a case the orifice of the prepuce is reduced to a small opening, it much resembles a contraction of the orifice of the glans, impedes the flow of urine, and lays the foundation for a derangement of the functions of the bladder, whenever, from any accidental circumstance or irregularity, inflammation shall have been excited in the urethra.

The width or diameter of the urethra is very uncertain, and the passage of instruments should be regulated by the size of its orifice, which will be found to be the smallest part, with relation to every portion of the passage. I know but of one exception, and that is in some few persons, in whom the narrowest part is situated in sight, and about a quarter of an inch within the orifice, which is usually large. This is a natural formation; but this part, in such persons, is often the seat of stricture, which should always be divided with a small blunt-ended knife. The relief is immediate in the subsidence of the symptoms of irritation. From this point the instrument will pass with perfect ease, until it reaches the commencement of the bulbous part of the urethra, where the canal becomes a little narrower. The bulbous portion of the urethra, behind this point, is said to be larger than the anterior part; but I do not believe that it is, although it may appear so from a slight contraction at the commencement of the membranous part, which makes it the smallest of all except the orifice. The positive size of the urethra varies in different persons. I have a solid bougie, rather more than half an inch in diameter, No. 20 of my scale, which I had made for one gentleman in particular, through whose passage it passed with perfect ease. Very few urethræ will, however, admit sounds larger than from 12 to 16, or from three to four lines in diameter; and the dimensions of the urethra are not influenced by the size of the penis, although that part is occasionally elongated and even enlarged by continued traction under disease. The orifice of the urethra is then, with the exception I have stated, the smallest part of the canal, and the least capable of extension, while every other part may be stretched considerably beyond its natural size without much difficulty; but the orifice scarcely yields without tearing, which occurs from the peculiar dense structure of its very edge—a structure peculiar to the part, but in some degree analogous to that which forms the edge of the eyelid. If this should be destroyed by ulceration, its value and utility are seen, for the part from which it has been removed contracts; and if the whole of the orifice has been deprived of its edge, the opening becomes so small as to act often like a stricture, and to give rise to symptoms equally distressing, which are most difficult of cure. The evil seems to arise from the unyielding nature of the cicatrix, and the resistance which it opposes to the bladder, rather than to the small size of the opening; for in many persons the orifice of the urethra is not situated at the end of the penis, but quite underneath, about the middle of the part, where the frænum is usually placed, in which case the opening is always a small one, scarcely ever admitting more than a No. 6 bougie, yet stricture never occurs in these people but as a consequence of disease, capable of giving rise to it in others differently formed. The orifice of the urethra, even when in its usual place, is often much below the medium size. This is often caused by a sort of valve or hymen, which passes across the lower part, and can be readily shown by a bent probe, on which it may be protruded and divided in all cases in which it is necessary to introduce instruments for the cure of stricture or the removal of calculi. The orifice may also be unnaturally small, although otherwise well formed, when compared with the size of the canal within, in which case it should also be divided. This should be done with a small, sharp, but strong iris knife, carrying it directly downwards, or with a small spring bistoury; but the wound is apt to unite if care is not taken to keep the edges apart by introducing between them a slip of thin linen, and from time to time a bougie. Larger instruments may be afterwards introduced, and a more permanent cure effected than if the orifice had remained untouched; for a bougie which passes with ease through a small opening of this kind, must be much smaller than any other part of the canal, and cannot consequently dilate it to a proper extent.

When the orifice of the contracted urethra is enlarged, an instrument should be selected for examining the passage which will pass through this part with ease, and then, if it has a proper curvature, and is well managed, it will meet with no obstacle in a healthy urethra in passing into the bladder. In all common cases the patient should stand before the surgeon, and the solid bougie may be introduced with the convex part upwards, or with the handle turned towards the left groin, or with the concavity upwards. If the former, the instrument takes the course of the pendulous part of the urethra, and will be arrested by the bend it makes in becoming so. This, which in people of small stature is often an insurmountable obstacle when the instrument is retained in that position, is easily obviated, and indeed avoided altogether by turning the handle of the sound half or wholly round, until it becomes perpendicular or vertical, the concave side being turned towards the patient, when the handle should be kept close to the body. It should then be very gently pressed on, until it appears to meet with an obstacle, or rather not to proceed, when, if the handle of the instrument be lowered or brought directly downwards, the point of the instrument will glide into the bladder. If the surgeon should have any doubt of the fact, he may ascertain it by bringing down the handle until it falls in a line drawn between the patient's ankles, when, if he feels that the point is free, he may be satisfied it cannot be anywhere else, unless he has used a degree of violence quite unsurgical, as well as nearly unbearable. If, on lowering the handle, the point will not pass on, the handle must be again raised, carried close to the abdomen, and gently pressed a little further into the urethra than it was before; when, on lowering it once more, it will probably slip into the bladder. The natural obstacles, as they are called, which are to be met with after passing the bend caused by the pendulous part, are two: one, according to M. Amussat, is caused by a fold of membrane passing from the urethra to the pendulous portion of the bulb; the other by the edge of the triangular ligament which passes under the urethra. This will be best avoided by keeping the urethra on the stretch, after the handle of the instrument is placed in the vertical direction, until it is lowered, and by bearing the point of the instrument against the upper surface of the passage. If the handle of the sound is lowered too soon, whilst the urethra is not sufficiently on the stretch, the point will be borne against the triangular ligament at that part where the urethra is firmly attached to it, and cannot proceed until it is extricated from this situation, which is to be done by withdrawing the sound for the space of an inch, then bearing it steadily forwards, and against the upper surface of the urethra, until it has passed the obstacle. I have had many persons under my care in whom it was impossible to pass a sound but in this way, and then it was very easily done—proving by the size of the instrument that the obstruction was a natural defect, and not a stricture. A poor man came to me, unable to pass his water but by drops. He thought he had false passages, and all sorts of things besides; and it was really a difficult case, because every instrument met with obstructions, which rendered it necessary to change the direction of its point; and a person not acquainted with this case might readily fail in passing even No. 5, and conclude that the patient had a very narrow stricture, although I could with care pass No. 15. Such obstacles are formed by unyielding parts external to the membrane of the urethra.

If the urethra with the triangular ligament is separated from its attachment to the bones, and slit open on its upper surface, the urethra being put on the stretch, whilst the points of attachment of the triangular ligament are held steadily on each side, the ridge the ligament forms under it will be distinctly seen. If these attachments are left loose, whilst the anterior part of the urethra is stretched by the left hand, the other end being held by another person, and the forefinger of the right hand is run along the under surface of the urethra, it will meet with a little depression or fold which impedes the progress of the finger, and nearly in the same situation which M. Amussat affirms causes the obstacle met with in passing a bougie, rather than the triangular ligament. This fold is formed by the interior fibrous membrane of the corpus spongiosum, which passing outwardly where the bulb separates from the urethra, forms a sort of bridle around it; but I suspect he is mistaken in attributing much importance to it.

When a straight instrument is to be passed into the bladder, the horizontal position of the pubes and the attachment of the urethra to it, through the means of the triangular ligament, for the extent of its bulbous portion, are to be particularly borne in mind. By raising and gently stretching the penis, the urethra may be brought into a straight although an inclined line, commencing at the orifice, but not going on to the bladder. On the contrary, it passes through the membranous part of the urethra and terminates at that part which is embraced by the anterior portion of the prostate, against which the instrument, even if it should escape the other obstacles alluded to, is sure to strike. In a healthy urethra, by withdrawing the point a little, by letting the penis loose, and by a dexterous lowering of the handle, the attachment of the upper surface of the urethra to the triangular ligament being thus made the fulcrum, the point is tilted over the anterior edge of the prostate, and then passes readily into the bladder. It is sometimes, however, necessary to introduce a finger into the rectum to effect this object. When a straight sound is to be passed, the patient should be laid on his back with his legs drawn up, and his body bent a little forwards, which position favours the formation of an inclined plane of the urethra. The rectum should be previously emptied, that the prostatic portion of the urethra may not be elevated.

When the patient has an enlarged prostate, and the urethra behind the triangular ligament is lengthened as well as altered in its direction, the catheters should differ in shape from those in common use. They ought to be fourteen inches long, and from No. 10 to 12 in size, quite round at the point, with small holes at the sides of the end, and with a large curve. A silver instrument, selected so as to fill the orifice of the urethra, should be passed down to the obstacle for the purpose of ascertaining the distance only. This being done, it is to be withdrawn a little; and as the patient lies on his back, with his legs drawn up, the shoulders being a little supported, the point should be hooked beneath the pubes, when the shaft of the instrument will make a right angle with the body. The surgeon should now make his calculation, not as to how many inches the catheter has entered, but as to the exact situation of its point, which should only just enter the membranous part of the urethra, and yet be past the triangular ligament, and so far clear of the bone, although hooked against it, that it will on depressing the handle of the catheter, carry the upper surface of the urethra as near as may be against the inner surface of the pubes, and by this manœuvre ride over the enlarged portion of the prostate, which does not usually surround the upper part of the urethra. In doing this, the concave, or upper surface of the catheter, should at first be firmly applied to the under surface of the pubes, from which position it glides upwards, or towards the wall of the abdomen, as the handle is depressed. This act of steadying and depressing the handle must be carefully done; it requires very little force, but great dexterity, which can only be acquired by practice, and a knowledge of the anatomy of the parts; and will not always succeed on the first attempts. If the point be allowed to advance, by quitting the pubes, it may be forced through the urethra into the abdomen, or will only get into the bladder by passing through the substance of the prostate; which, when it occurs, does less mischief than might be supposed, as it is frequently only discovered after death.

When there is a lateral enlargement of the prostate, as well as of its posterior part, which is often called the third lobe, it is art alone, and not force, will overcome the difficulty. If the concave part of the instrument be kept steadily in such cases against the under surface of the pubes in the manner I have described, the point will in certain cases miss the right passage by passing over it, when the handle is brought down; and the resistance it meets with will be such, that the surgeon must be sensible the instrument can only proceed by piercing the part opposed to it. This may be avoided, and the difficulty overcome, by passing the large silver prostate catheter down to the obstacle or prostate, in order to measure the distance, which is then more precisely ascertained by withdrawing it a little, when the point will readily hook under the pubes. If it be again passed on so as to reach the base of the obstacle, it will be nearly opposed to the deviating part of the urethra, which is attainable in these particular cases only on the under part. In order to enter it more easily, the handle of the instrument should now be carried forward so as nearly to touch the abdomen, the point being kept as steady as possible. From the size of the curvature of the instrument, the point must however descend, in consequence of this motion of the handle, carrying the urethra with it towards the rectum, and stretching or opening that portion of it which is just between the commencement of the enlarged lateral lobes. This I have called the deviating part, into which the catheter will often slip, on the handle being quickly, but lightly or surgically depressed or brought down from the abdomen between the legs. It slides between the lateral lobes, and requires only a little help to carry it over the posterior or mounting part of the prostate when such disease is also present. If the catheter is allowed to move too far outwardly so as to have its point resting against the commencement of the membranous portion of the urethra, which may easily take place when the handle is carried forwards or towards the abdomen; this part may be pierced on its being brought down or depressed between the legs, an error which is to be avoided by keeping the point as steady as circumstances will permit. When this proceeding fails, the finger should be introduced into the rectum, upon or with the end of which the point of the instrument can be raised into the right course, and which is often absolutely necessary to be done, particularly when an elastic catheter is used. None of these manœuvres, or those to which I have otherwise alluded, can be accomplished without prostate catheters, of a proper size and shape, whether they be constructed of elastic or of solid materials.

In those derangements of the prostatic part of the urethra, and of the neck of the bladder, which are frequently met with in persons of middle age, without enlargement of the prostate, an instrument with a different curve is sometimes preferable, and will often pass with ease when the prostate catheter will not. I call it No. 2 prostate catheter, to distinguish it from the other, which is No. 1. It is shorter and straighter, with an inclination to curve at its extremity, rather than actually curving like the other. It has a small wooden handle with two eyes, in order that it may be tied in readily if necessary; and it is strengthened by a stillet of what is called flexible but stiff metal by the instrument-makers, having a ring at the end, by which it may be the more readily withdrawn. This particular curvature I obtained after many trials with a flexible metallic instrument, and I believe it to be the best. The common sound, or solid bougie, is made of polished steel, of a particular curvature, having a small wooden handle; the point being gradually diminished in size, for the last inch and a half, so that if the shaft of the instrument be as ten, the point shall be eight. Some should be made of the same size throughout, and others a little bulbous an inch or two from the point. These instruments may be plated or gilt, which prevents their getting rusty.

A solid bougie of a proper shape passes through a healthy urethra without stop or stay. It meets with no obstacle when managed by a surgeon conversant with the attachments of this canal, and it passes so easily and with so little pain and inconvenience, that the patient scarcely believes it has been introduced when it has been withdrawn. A well-oiled instrument of a proper temperature, a size or two less than the orifice of the urethra, will pass through it to the astonishment of the patient, when a small soft and pointed wax bougie will catch on something at every inch. A gentleman, who had been using small bougies of this kind by himself, came to me from the country, declaring he had an impassable stricture which rendered him miserable, for although he could make a tolerable stream of water he never could pass the smallest bougie in his possession, and he had great fears for the result. Finding that he could make a fair stream of water, I selected a No. 8; it went with ease: I then took a 12, it went as easily: a 14 followed as readily. The gentleman declared it was done by magic, whereas it was merely done by virtue of an instrument of a proper shape and size.

The solid prostate catheters should be made of silver, or of a soft metal, which is called pure tin by the makers, and answers well for large instruments, but not for the construction of small and pointed instruments, which are not only apt to break but to bend, and deceive the surgeon or person who is using them, by inducing him to believe they are passing on, when they are only bending. The greater part of the false passages which have been made in the urethra, were caused, I am satisfied, by metallic bougies, and I look upon them as very dangerous instruments. A surgeon always knows what he is about with a solid one; he never knows exactly what he is doing with a flexible one, if any great pressure is made with it. When it becomes necessary to keep a prostate catheter in the bladder for several days, it ought to be made of an elastic material, or of flexible metal, which lie in it with much more comfort to the patient. They take the form of the parts, and accommodate themselves to them in a manner a silver catheter cannot do, whilst the handle may also be bent down out of the way, instead of standing directly out and striking against every thing, as a silver one necessarily must do. A metallic flexible, or gum elastic prostate catheter will not always pass as easily as a silver one, even with a silver stillet, its flexibility preventing its point being duly acted upon by the motions of the handle; and in all cases of difficulty the silver one should be tried first, and if it passes, it should be allowed to remain for twenty-four hours, when the elastic or metallic one will generally follow, the obstacle having been in some degree removed or flattened, which allows the flexible instrument to rise or ride over it.

There is a great difference between the manner of using a metallic or flexible bougie, or even a common wax one, and a solid sound. I have already described the way in which this latter is to be managed, and have drawn attention to the fact of its point mounting or riding over an obstacle, by the motion which is given to its handle. The round point of a solid sound or bougie is always readily carried along or borne against the upper surface of the urethra; the point of a soft or flexible instrument will almost always be carried along the under surface of the urethra; and as all the parts which can cause obstruction, except the lacuna magna, are to be found on the under part, it must necessarily meet more readily with them; especially as the passage of the flexible instrument is effected by a steady pressure of the finger and thumb, without any but a forward motion being communicated to the point. This is the cause of the frequent failure of a soft or flexible bougie, whilst a solid one will pass with ease. When the curve of the solid bougie does not correspond with the opening of a stricture, and which occurs most frequently in short persons, in whom the curvature of the canal is greater for their size than in taller persons, a soft wax bougie will often pass through much more readily, and is to be preferred. I have had many gentlemen under my care, who had suffered from strictures several years, and had freely used metallic bougies, which would not proceed when the stricture was narrow, although I could pass a soft wax one of the same size with ease. Metallic bougies are not then to be recommended, and metallic catheters are only to be used when they will pass with ease. Catheters made of caoutchouc are very valuable and necessary instruments, in cases of mere retention of urine, when it is necessary to draw the water off to give relief, and in cases of diseased prostate; but as they cannot always be passed with an iron stillet, from the irritation it occasions, whilst it deprives them of their flexibility, many surgeons, and particularly the late Sir E. Home and Sir B. Brodie, have recommended that elastic prostate catheters should be always kept upon a curved iron stillet, so that when taken off they may in a great measure retain that degree of curvature which has been found most successful in passing over a diseased prostate; and which curvature can always be increased or diminished, and the direction of the point altered, by pressure with the point of the finger in the rectum or on the perineum. When the elastic gum catheter is filled by a solid stillet, it can be made to act almost like a silver one, and possesses the advantage of lying more quietly in the bladder when the solid stillet has been removed. No. 4, in the accompanying diagram, is the elastic catheter on the stillet, and of that curvature which will, when the stillet is removed, bring it to its proper form for use, and which it will for a time retain.

Dr. Civiale, who saw, when in London, the care bestowed in the preservation of specimens of disease of the bladder and urethra, in which false passages had been made, and which care is not taken in Paris, where they are rarely preserved, and where they are consequently not seen, concludes, in his "Memoire sur l'Anatomie Pathologique des Retricissemens de l'Uretre," that these evils have arisen in a great measure from the faulty construction of our catheters and sounds, which he considers to be too much bent. In London, we are apt to think that false passages occur more frequently abroad than at home, from the circumstance of their instruments being too conical and too straight.

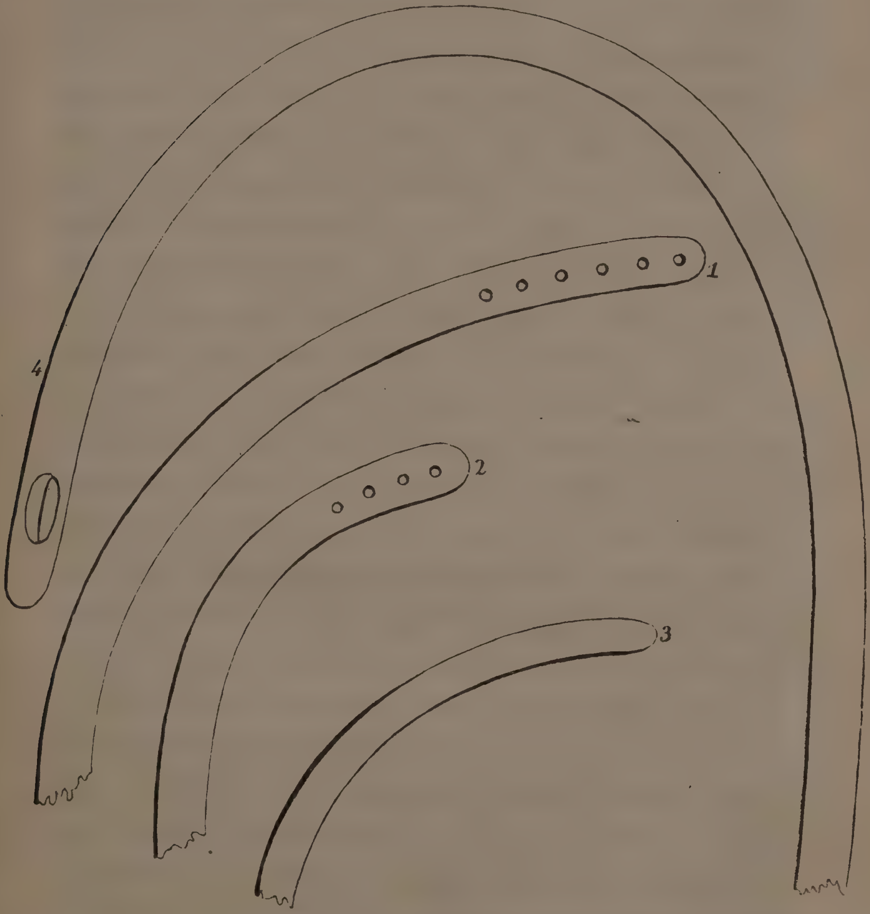


Fig. 1. Prostate Catheter, No. 1.
Fig. 2. Prostate Catheter, No. 2.
Fig. 3. Common Solid Sound, or Catheter, No. 3.
Fig. 4. Elastic Catheter, or its Stillet, No. 4.

There are two kinds of wax bougies in use: one soft, capable of retaining an impression with ease; the other made of harder materials, so as to be capable of taking any form when slightly warmed, but which still opposes considerable resistance to pressure. Small catgut and elastic gum bougies are often found of essential service in cases of very narrow stricture.

The inner lining of the urethra is cuticular, covering a mucous membrane, which is also elastic, and endowed with great and peculiar sensibility. Mr. Hunter supposed there was a muscular coat exterior to this, composed of fibres so small as scarcely to be detected by the microscope, and Sir E. Home thought these were united to each other by mucus instead of tendons, a state which may exist, but which is not easily understood. Others again consider these muscular striæ to be merely a vascular arrangement, or to be elastic fibres superadded to the membrane itself. Whatever may be hereafter proved to be their ultimate structure, the three divisions of the urethra are very differently circumstanced with relation to the surrounding parts. The membranous part of the urethra is surrounded by the peculiar muscle which compresses and closes it, so as to act as a sphincter; but the contraction of the muscle which surrounds this part of the urethra in so evident and perfect a manner does not often give rise to permanent stricture, although, in an irritable state of the urethra, it assists in causing that which is denominated spasmodic. It may compress any thing introduced into the canal and flatten it; it may render the canal impervious when strongly excited; but it does not remain permanently contracted, or give rise to continued stricture or obstruction, unless the intervening parts have been frequently subjected to attacks of inflammation. The urethra at this part, membranous as I have described it to be, and capable of being reduced to a single layer of mucous tissue, is not applied in this state to the inside of the muscle. There is a quantity of condensed cellular and fibrous structure between them, so that the wall of the canal is not only here composed of a cuticular, a mucous, and a vascular layer, but of an external thin covering of fibro-cellular structure, something resembling the coat of an artery, and by which it is connected to the sphincter or compressor muscle. It passes through the triangular ligament in this state to meet the bulbous portion of the urethra, and it is rarely, except where it meets with it, or the spongy body, that strictures are found in disease, unless they are of long standing, have given rise to much external mischief, and have been propagated backward by repeated attacks of inflammation in a contiguous structure. It appears therefore a reasonable deduction, that it is in consequence of something which is added, rather than on account of something which is taken away, that stricture takes place.

An irregular action of the accelerator urinæ muscle is supposed to be materially concerned in the formation of stricture, immediately anterior to the triangular ligament, and if stricture existed only at this part, the inference might be a just one; but stricture often takes place at or near the orifice of the urethra, and for two inches backwards, to which parts no fibres of this muscle extend; whilst the membranous portion of the urethra, which is surrounded by a muscle acting as a sphincter, is usually free from this disease in the greater part of its extent. If then the part posterior to the accelerator is free from stricture, although more intimately and closely connected to, and surrounded by a stronger muscle than the accelerator, when compared with the space it covers; whilst the very anterior part, which has no muscle at all, is affected by contraction; it must be admitted, that the action of the accelerator muscle cannot be the immediate cause of stricture in the intermediate part. In the horse, the accelerator muscle surrounds the whole of the urethra anterior to the pubes, nearly up to its orifice, and its action is assisted by the two retractor muscles which lie upon it; but in man the accelerator does not continue along the under part of the urethra to near its extremity. Now, if the horse had stricture at this part, and the man had not, then it might be fairly attributed to the action of this muscle; but as this is not the case, the undue action of the accelerator urinæ, or ejaculator seminis, as it is also called, can only be supposed to keep up and increase the mischief, when the parts within are inflamed or irritable; but it cannot give rise to permanent disease.

The whole anterior portion of the urethra, or that part in which stricture is more usually situated, is surrounded by the corpus spongiosum, or spongy body of the urethra, and it is to it that I am disposed to attribute the principal share in the formation of the worst kinds of permanent stricture, and the great difficulty which is experienced in effecting a perfect, or radical cure.

The whole corpus spongiosum, including the bulb, is formed originally in two symmetrical halves or parts, which unite to form one body, having a septum between them. The manner in which the urethra enters the corpus spongiosum is evident, and the highly vascular texture of the bulb and spongy body is shown by injection from the internal pudic artery. It is nearly as red as the inside of the stomach of an infant. The elasticity of the urethra when surrounded by its spongy body, is shown by introducing a solid sound into it, when by turning the point downwards it may be stretched to a considerable extent in every direction. If the person should have an old narrow permanent stricture at the distance of two or three inches from the orifice, the experiment may be made most conclusively, for the urethra will stretch at every part anterior to it with great ease; but when the solid sound reaches that point it can penetrate no further, the elasticity of the part is lost, the hardened obstacle formed by the stricture is distinctly felt from the outside; and by turning the sound, its point may be felt through the external parts projecting below the obstacle and carrying the urethra before it. If a sound just large enough to go through a stricture of this kind is passed, and the urethra is examined between the finger and thumb, the extent of the stricture may be easily ascertained by the hardness and thinness of the part, which is quite peculiar, and distinct from the natural structure which is either before or behind it. If the instrument is withdrawn and the same spot is again examined, the hardness will be very perceptible when compared with the soft elastic sensation communicated by the spongy body in its natural state. The hardness is sometimes like a cord, and occasionally when circumscribed, like a small hazel nut. In the erectile state this hardened part is not augmented in size, although the spongy body is distended before and behind it. It remains a stationary hard line or spot, connecting the two distended parts together, and when the stricture is in an irritable state often giving pain. If this hard part be cut into, the corpus spongiosum seems to have lost its spongy appearance, its erectile texture has become consolidated, and resembles rather a solid gristly substance than an elastic structure. This kind of disease is very apt to form after the urethra has been ruptured, during the severity of what is termed a chordee. The inflamed part yields to the distending power of the two erectile bodies, and having lost its elasticity is torn; the tear extends into the spongy body itself, blood flows freely from the orifice of the urethra, and the cells of the corpus spongiosum around the rupture become loaded with it. Inflammation follows, and without great care be taken in the treatment, a permanent stricture will be the result.

When the mucous membrane is inflamed, and has lost part of its elasticity, it does not always yield as readily under distension as some of the interstitial parts of the corpus spongiosum; which, when they give way, allow some blood to be extravasated in the strict sense of the word; and a soft swelling takes place, which is a sufficiently remarkable although not a very common accident. I have seen, in three or more instances, a soft swelling of this kind about two inches and a half from the orifice of the urethra, which appeared suddenly. The urethra in all was inflamed, but was not ruptured, and a full-sized bougie could be readily passed along it. These swellings gradually altered their appearance, became less, and gradually disappeared. In a case which I treated many years ago in the York Hospital, a swelling situated in the same place was as hard and as circumscribed as if a Barcelona nut had been inserted into the under part of the urethra. It was quite cartilaginous to the touch, and the man made his water almost by drops. I removed this disease by the repeated but careful application of the argentum nitratum, so that no signs of it remained externally, the hardness having gradually diminished until it went entirely away. The man, a soldier, was to have been discharged, but on leaning over his bed to fold up the blankets one morning, he fell forward dead. I opened him next day, and found the aortic valves of his heart diseased. The urethra appeared quite sound, and to my great surprise nearly as much so at the part which had been affected as at any other. A stricture of this kind cannot however be always cured by caustic. The swelling and hardness oftentimes increase rather than diminish under its use, more particularly when situated farther back, and the division of such a stricture becomes at last inevitable. When a nearly impassable stricture is formed at that part where the urethra becomes pendulous, and particularly where it is covered by the scrotum the inflammation which frequently supervenes causes retention of urine, one or more small ulcerated openings take place behind the stricture, the urine escapes in small quantities into the surrounding textures, inflammation occurs in them, and is followed by a hardening of the parts, until they nearly resemble gristle or cartilage. A stricture of this kind may be dilated, and the disease kept at bay; it will never, however, be cured by caustic of any kind, and sooner or later the division of such thickened parts becomes necessary to save the life of the patient. A middle-aged gentleman, who had lived many years in the West Indies, came under my care in the year 1819, with a cartilaginous swelling of this kind, just within the anterior part of the scrotum, of the size of a pullet's egg. I tried various ways of getting through the stricture, without success, and proposed the division of the hardened mass, and the stricture from without, to which he assented, when unfortunately the surgeon of the establishment to which he belonged interfered, and undertook to destroy it with caustic, which at last gave rise to complete retention of urine, abscess, effusion of urine into the scrotum, and death. When such parts are divided, the urethra is found to form part of the mass, and the thinned and ligamentous corpus spongiosum is included, and is scarcely discernible in the surrounding texture, formed by the deposition of lymph or albumen, through which the little fistulous canals permeate and distil their urine.

A small tumour may form, from common causes, external to the mucous membrane of the urethra, although connected with its outer wall, and impede, in some degree, the flow of urine; but as the canal is not really diminished, although turned aside, the stream is not observably impaired, and little inconvenience is sustained by the patient.

In repudiating the opinions which have been entertained, of a muscular structure of the urethra being the essential cause of contraction in this part, it is not intended to attribute it entirely to the elastic structure of the corpus spongiosum. I have declared, contrary to the received opinion of modern surgeons, that stricture takes place at the neck of the bladder, at the inner end of the urethra, to which part the corpus spongiosum does not reach by a considerable distance; and cannot therefore be the cause. All that can be admitted is, that the corpus spongiosum contributes largely towards rendering a contraction more permanent and more difficult of cure; although its absence cannot be the cause of the freedom from stricture, enjoyed by the membranous and prostatic parts of the canal. If the membrane of the urethra at its vesical end, connected only with elastic and cellular structures, or a few muscular fibres, can in any cases, however few, become hard and inelastic, so as to form a bar or stricture; it is manifest that the very membrane itself must possess some properties, the deprivation of which leads to the evil. I apprehend it is rather from the loss of the elasticity of these parts, principally caused by inflammation, in some of its various shades and stages, rather than to a wrong action of muscular fibres, which have not been satisfactorily shown or proved to exist, that the hardening of a fibre, or the formation of a stricture, or a permanent contraction take place.

The urethra is scarcely sensible of the natural stimulus of the urine when in its normal state; but when it is affected by even a low degree of irritation, its sensibility is greatly augmented. It becomes immediately aware of any increased stimulating qualities of the urine, and pain is induced; the continuance of which, and of the irritation caused by the alterated state of the urine, give rise to further disease in the canal, from whence the importance of attending to the state of the urine in the early stages of derangement of the urethra, whether it be loaded by an excess of lithic acid, or the secretion be altered, so that it has become alkaline, and capable of depositing the phosphates of lime, or of ammonia and magnesia. The appearance of the urethra, when the canal is slit open, varies a little in colour; during life there can be no doubt of its being of a bright red, which arises from its great vascularity, a fact easily ascertained by separating the sides of the orifice. This redness gradually diminishes in intensity in the course of the urethra, and after death it disappears. The inside then is found more or less of a light yellowish colour, deepened or redder at those parts which in general possess most sensibility when in a state of irritation. Thus the bulbous and membranous portions, and particularly the bulbous, are of a reddish colour; whilst the prostatic part is of a pale yellow: yet that, and the neck of the bladder, the colour of which is equally pale, are often most acutely sensible.

The surface of the urethra in a state of health, is lubricated by a secretion of mucus sufficient to defend it from the irritation of the urine; but not so abundant as to flow from the orifice, which is not a round opening, but rather resembles a mere slit, from the edges being applied to, or in contact with each other; a state which is supposed to exist throughout, when the parts are quiescent. When the erectile tissue is distended, the urethra is elongated, the sides are separated from each other, and the canal becomes more or less enlarged or round. It is only fully distended by a continued stream of urine.

The urethra thus formed is a tolerably strong canal, and not liable to be perforated by instruments introduced into it, when they are used with common dexterity and moderation. Of the various parts of it, the membranous portion has usually been supposed to be most easily and most frequently torn; I am convinced, however, from repeated dissections, that false passages more usually begin a little anterior to it, in the bulbous portion, and pass by the side, or under the membranous part towards or between the bladder and the rectum; or they begin at the termination of the membranous part, and pass through the prostate. I am aware that false passages are sometimes made in the superior part of the urethra, passing through the upper part of the prostate into the bladder, and even into the bladder without touching the prostate; but such cases are very rare.

## CHAPTER III.

### ON THE FORMATION OF SPASMODIC AND PERMANENT STRICTURE.

In maintaining the opinion that the urethra is elastic, and not essentially muscular, I am not disposed to admit that the changes which take place in it, and lead to the formation of stricture, can occur from *inorganic elasticity* only, or the same kind of property which is found in Indian rubber; but that something must necessarily be added, to enable us clearly to understand the subject. I am led, therefore, to make a distinction between the common elasticity residing in a spring, or in Indian rubber, and the *vital* elasticity which exists in all the elastic parts of the human body, subject to the changes which may take place in it under disease.

The principal derangements which follow these changes are said to be *spasmodic*, or *permanent*.

The only case of what may be called pure spasmodic action which has come under my observation, occurred in a gentleman, who came to my house twice in the course of several years, declaring he could not make his water, and desiring to have a catheter passed; which was each time done without the least difficulty. The first time he came he was quite aware of his situation; said it arose from anxiety of mind relating to family affairs, and that the passage of the instrument would immediately and effectually relieve him. If there were an obstacle, and I was by no means certain of there being any beyond a hesitation, it was at the commencement of the membranous part of the urethra, and arising, I suppose, from a spasmodic contraction of the compressor urethræ muscle. As this gentleman suffered no kind of inconvenience at any other time, I am induced to believe that there was no particular irritation in the urethra, and that it was, as the cause is unknown, what may be called accidentally spasmodic. I have heard of a lawyer, but I do not recollect where I heard it, who often suffered in this way when engaged long in court in a difficult case, and who was always relieved in a similar manner; but here I should say it is more than probable the individual was labouring under some slight permanent irritation in the urethra, or that it was at least in an excitable state at some one part near the bulb. A healthy man, suffering from anxiety and alarm, often feels a desire to pass his water, which he cannot at all times restrain, and it flows whether he will or not; but if he has the power of restraining it for hours, then, indeed, the powerful contraction of the compressor urethræ may bring on irritation in the part, and spasm of the muscle; but this is the result of its own irregular and long continued action, inducing irritation as the first step to inflammation, and is of exceedingly rare occurrence; still it is not an instance of pure spasm, like the case I have related, in which the incapability was preceded by no uneasiness until the attempt at micturition was made.

The more common cases, which are usually considered spasmodic, are those of young men, who, when suffering from gleet or gonorrhœa, which have been imperfectly or only partially cured, are tempted to commit an excess in wine or punch. After sitting some time, they feel a desire to make water, which they repress, or perhaps indulge with some difficulty, but which increases, and is soon found to be irrelievable without assistance. The greater the effort, the more determined the straining, the greater the agony; and the sufferer, with despair depicted in his countenance, entreats relief. The practice often recommended in such cases is, to relieve, first, the spasm by sending him to bed, by putting him in a hot bath, by fomenting the parts with hot anodyne fluids, and by giving him a dose of the pulv. ipecacuanhæ comp.; under the influence of which, in the course of a few hours of misery, it is not improbable that the urine may begin to flow. He is then to be purged, and it is likely that his urine may the next day flow in a full stream, when the evil subsides. I was taught a better practice many years ago by a Scotch friend of mine, a young man although an old soldier, who, after a debauch of this kind which lasted half the night, found he could not make water when he awoke in the morning from his feverish dreams. He sent for me, begging I would bring a catheter with me. When I arrived, I proposed a warm bath, an opiate draught, etc., his answer was preremptory enough, "Damn your draughts, Doctor: pass the catheter, I have had it before." As remonstrance was useless, I passed the instrument with some little difficulty, and drew off his water; upon which he jumped into bed, saying, "God bless you, Doctor! but damn your physic." In the afternoon when I saw him he was nearly free from inconvenience. Since that time I have always made it a rule to endeavour to pass a small gum elastic catheter in every case of what is called spasmodic stricture, or retention of urine. If it passes, so much the better; if it does not, the patient submits more cheerfully to the injection of a large quantity or repeated quantities of hot water into the rectum, and when the bowel is clear, and the hot water has acted as a bath to the neck of the bladder, to an enema composed of two grains of opium dissolved in two ounces of warm water. This will usually remain, and by its sedative qualities give effectual relief. If it should not, the same kind and quality of injection should be repeated every two or three hours, if the patient should not sleep until the urine begins to flow, with half a grain of the muriate, or acetate, or bi-meconate of morphia, in a pill or draught.

These are called cases of spasm, but they are cases of irritation, which induce a want of consent between the muscles of the parts, so that when the bladder contracts, the muscles surrounding the urethra will not act by yielding and dilating as they ought to do, but remain, or become more permanently contracted; in consequence of which the urine is forced against the inflamed and contracted part of the urethra, and by its irritation increases the mischief. When the water is drawn off, the desire to pass it is removed, and the greatest irritation on the inflamed or irritable part of the urethra is thus taken away. When a person under these circumstances is restored to his usual state, and an examination is made of the urethra a few days afterwards, by an instrument of a fair size, but which the orifice will easily admit, it will be found to pass readily to the extent of from five to six inches in the greater number of cases, when it begins to cause a sensation, probably of pain, which was not experienced in the preceding part of its course. The surgeon is sensible of a resistance which is greater than might be expected, whether he uses a solid or a wax bougie, but which, after a little gentle pressure, yields, and the instrument passes into the bladder, without further inconvenience than its giving rise to a desire to make water. This is called overcoming a spasm; but it is a spasm which is always present, and not temporary. It cannot therefore be a spasm, the essential character of which rests on its being only of casual and temporary existence. What is called a spasmodic stricture, is really no such thing, but a narrowing of the part, caused by its inability to dilate, and depending on some change in its vital elasticity. It is the first step in the formation of a permanent stricture, although its effects are augmented by the spasmodic action of such muscular fibres as may surround the urethra at the part affected.

A *permanent* stricture depends upon some positive alteration of structure of the wall of the canal, which causes it to thicken, and at the same time deprives it of its capability of being dilated with the same facility, and to the same extent as in a state of health. This alteration of structure is produced by inflammation, although it is difficult to account by it alone for the various appearances which these altered parts assume. If the theory laid down by Mr. Hunter could be maintained, and the circular or the longitudinal muscular fibres described by Sir E. Home and M. Bauer could be satisfactorily demonstrated to be muscular, nothing could be more simple than the manner in which a stricture might be formed; and it is this simplicity which has won the belief of so many surgeons in that which they could not see, but which, from its appearing so very satisfactory, they even wished to be the fact. A temporary, or spasmodic contraction of a muscular fibre, is a very intelligible thing, and that after a time a continuation of this state should bring on inflammation and thickening, is consistent with our general knowledge; and it is to be regretted that a stricture should not always be formed in this manner. A permanent stricture, which has offered during life considerable resistance to the passage of an instrument, may be found after death to have been formed by a mere line of irregular thickening, extending only for a third of an inch in an oblique direction along the canal. In most instances it is more or less circular, generally affecting the under rather than the upper part. The best case of this kind I ever saw was in a journeyman baker, who came to me many years ago with a stricture, not exactly at the orifice of the urethra, but at so short a distance from it, that it could be distinctly seen passing across the canal, like a thin fold of membrane. The opening for the passage of the urine was on the right side, and would not admit the end of a common probe, although a small one for the lachrymal duct could be passed into it. The temptation to divide this was irresistible; and after having dilated the orifice, I cut through the septum, which resembled an opaque membrane drawn across the canal, with a blunt-pointed iris knife, and removed the disease, which appeared to be formed from the inner mucous membrane alone, and with it the irritability of the bladder, and the corresponding desire to make water, which had rendered him miserable. The successful result of this and of other analogous cases induced me to adopt a similar method of treatment in a stricture of the rectum, about two inches from the verge of the anus, which occurred to me some time afterwards. The patient, a gentleman from Jamaica, was only able to pass a urethra bougie, No. 12, and which he had been doing, under the direction of his medical attendant, for some time, because a larger one could not be introduced. His situation was distressing, and demanding almost imperatively that some greater effort should be made for his relief. The very point of the forefinger ascertained most distinctly that the opening was in the middle of a septum, extending in every direction from the circumference, and I did not hesitate, after several examinations, to introduce a guarded and blunt-pointed bistoury through the opening, so that the blunt end just passed beyond it. I then turned the part of the edge near the blunt end, which was left unguarded, in four different directions in succession, and divided by each cut a small portion of the septum, when a bougie of twice the former size passed without difficulty. I was obliged to repeat this operation twice, at proper intervals, when the largest sized rectum bougie in common use passed easily, and the gentleman returned to Jamaica, cured; although with the direction to use the bougie from time to time. The practice adopted in this instance has been followed by others with the greatest advantage in similar cases; and although a discharge continued from the gut until his death, which took place several years afterwards, the contraction never returned. These two cases, in addition to others I have met with since the first edition of this work, not less marked, satisfied me that a mucous membrane was capable of producing a particular septum-like contraction in its proper canal, without the participation of its muscular or of its elastic coat; for I cannot believe that the muscular coat of the bowel formed a part of the stricture in one instance, more than that the elastic coat of the urethra did in the other. Repeated dissections have proved to me however, that in permanent stricture of the urethra, the external or elastic coat is always more or less implicated, and that the degree of implication is usually in proportion to the obstinacy of the stricture. Thus, for example, a stricture two inches from the orifice will be the most obstinate and the most difficult of cure, in which the corpus spongiosum is found to be hard and unyielding to the touch. It is only to be exceeded in obstinacy of resistance and difficulty of cure, when this part is smaller and harder than natural, when it has, in fact, become impervious or nearly so, to the blood, by which in its erectile state it ought to be distended. A gentleman presents himself with a stricture four or more inches distant in the canal, which at the orifice is capable of admitting a No. 13 or 14 solid bougie, but the stricture will only allow a No. 6 to proceed. This is dilated slowly, until a No. 10 or 11 will pass easily. The patient, anxious to have his cure completed, presses his surgeon to increase the size; who, yielding to his solicitations, passes over the intermediate number, and takes the 13 or 14 at once; which he will often be able to do with little uneasiness at the moment, but the patient, on wanting to make water two or three hours afterwards, finds he cannot do it: he strains, but it comes only by drops. The desire increases to misery. Theory teaches us to put him in a warm bath, and bleed him if necessary, for the case is one of inflammation; practical surgery says, do nothing of the kind, but take a small elastic gum bougie without a stillet, and draw off the water. The patient will be immediately relieved, and will in all probability sleep soundly, with the aid of twenty minims of Batley's solution of opium; when he awakes he will make his water without assistance; but if the surgeon tries to pass a bougie for some six or eight days afterwards, he will find himself very much where he was when he began, that is, able to introduce only a No. 6. The part has contracted as closely as ever; and all the time bestowed on the treatment will be lost. The necessity for great gentleness in all these cases cannot be more forcibly exemplified.

A gentleman had been a patient of mine many years ago, for the cure of a fistula in ano, and of strictures of the urethra. When we parted, I recommended him to pass a bougie from time to time to prevent their return. This advice he neglected; and finding great difficulty in micturition, he applied to a practitioner of eminence in the Netherlands, who, after a long continued trial, passed a sound for ten inches, and said it was in the bladder; but as the symptoms did not diminish, he fixed a gum elastic catheter in the urethra, and kept one there, changing it occasionally, for fourteen months. The patient did not discover that the water did not pass through it, but came by the side of it for many months; and as the symptoms still continued unabated, the surgeon proposed to inject some warm water, and at last injected the rectum so full, that the patient discharged at once a pint or more per anum. He now thought it time to give up the catheter, and some months afterwards came to London. It was quite clear, after due examination, that the catheter had passed behind the prostate, although the opening into the rectum had closed. The false passage began just anterior to the membranous part of the urethra, and the natural opening, or canal of the urethra, was so small, and the false passage so large, that every thing took that road, and it was only after a great many trials, and after great attention and management, that a small gum elastic catheter could be got into the bladder. After a few days, this was increased in size, and as he was in the habit of using instruments, he got others made to suit himself, and went on to No. 14. I now advised him not to increase the size, as some urine came through some old fistulæ in perineo, but to pass a smaller silver catheter every other day. He suffered no uneasiness from his No. 14, and used to walk the streets and dine at his club with it in the bladder, without thinking about it. One morning he left out his gum catheter, and on trying to pass a silver one the next day, he found, to his great surprise, the attempt to do so gave him excessive pain, and that it would not proceed even for half an inch. He came to me directly, saying a horrible spasm had seized him. I tried a No. 8, and found it would not go half an inch without great pain, a smaller one was arrested at three inches, by a spot which had heretofore shown little signs of disease, and was carried into the bladder with great difficulty.

In these cases, which are very common, there is really little or no spasm. The external elastic structure of the urethra has been dilated, perhaps beyond what it can bear, and irritation and perhaps inflammation have ensued. None however occurs, as long as the dilatation is continued; but as soon as the pressure caused by it is removed, and the urine passes over the part, the sensibility becomes greatly augmented, inflammation takes place, and the part contracts by its vital elasticity; by which I understand something like that property possessed by the middle coat of an artery—a property very observable during life, but which is lost after death. These cases may be yet conveniently called instances of spasm affecting permanent strictures: but where the urethra is really diseased, and the outer elastic structure is implicated, it is not necessary to have recourse to the idea of spasm of any muscular structure external to it, for an explication of the mischief, and more particularly when such structure cannot at present be demonstrated. I apprehend it is an error to suppose that spasmodic stricture takes place more frequently in the membranous part of the urethra, which is surrounded by a muscle, than in the part immediately before it.

That the muscular coat of a canal can exert an especial and long-continued influence upon it, without leaving any sign of a permanent contraction observable after death, I have had opportunities of seeing; and in one case in the œsophagus, in a very remarkable manner. The patient, a young lady, had suffered for years from repeated difficulties in swallowing, which at last became positive obstructions, preventing the passage of either solids or fluids for days. The obstruction usually yielded almost suddenly, and the lady could then swallow liquids and small masses of food with tolerable ease. A good-sized œsophagus bougie could then be passed with little sense of opposition, although the obstruction was distinct, when swallowing was impossible. It was situated about an inch below the situation of the cricoid cartilage, and no bougie could then be forced through it, although frequently attempted by several very able men. As the complaint continued, the impossibility of passing a particle of food became more frequent, and lasted for eighteen, twenty, and six and twenty days together, so that at last the lady became quite exhausted, and died from inanition, in the full possession of her senses. On examination, I found the œsophagus externally of its natural appearance, without the slightest sign of constriction. When slit open, it appeared of its usual thickness, and without any deviation from its ordinary state with respect to the appearance of the muscular layers; but on the inside, and adhering firmly to the mucous coat, there was a false membrane, the upper edge of which appeared to have been separated. in consequence of the repeated application of the bougie, and a little turned inwards, so as to fill up, in part, the canal, through which, however, any common-sized bougie could after death be passed. The mucous membrane from this part onward to the stomach, which was not allowed to be examined, seemed to have lost its normal character, and to have taken on that of a serous one, on which a false membrane readily forms, but which rarely occurs on a mucous one, unless some great alteration in it has previously taken place. The difficulty in deglutition which existed at all times, for several months, arose from this false membrane, which could be peeled off, and resembled chamois leather; whilst the permanent and insurmountable obstacle, which often occurred for three weeks at a time, must have arisen from the addition of muscular contraction, although no trace of permanent stricture was observable after death.

The formation of a false membrane in the urethra is an extremely rare occurrence. M. Rayer has related the history of one case, and given a drawing of the appearances observed after death. Dr. Civiale says he has seen others. Colonel H. came under my care in 1842, with symptoms of disease in the kidneys and bladder, having passed some white gravel, and with the knowledge that he had had stricture in the urethra for many years, for which he had been under the care of several surgeons, both at home and abroad. The stricture in the urethra was five inches and a half from the orifice, and allowed a No. 8 bougie to pass through it without much difficulty; but when the bougie approached the neck of the bladder, it experienced considerable obstruction, and would not proceed sometimes for two or three weeks. There was evidently disease of the neck of the bladder, of its internal surface as well as of the kidneys, the urine being generally muco-purulent and alkaline. M. Civiale, when in London, saw this gentleman with me, and was led to think, from the impression the end of a soft bougie received, that there were cells, the remains of abscesses, in the prostate, although no enlargement could be distinguished per anum. A solid instrument could rarely be passed into the bladder, and then only with great difficulty, even after the elastic one had preceded it; but as he had passed several small pieces of triple phosphate calculus, and the presence of a larger one in the bladder was ascertained from the grate given to the elastic bougie, I succeeded, after much patience and trouble, in getting into the bladder a small screw instrument, with which I caught and broke up a stone, bringing some part away between its teeth. Dr. Hoskins Elliott's solvent was afterwards used with good effect, dissolving each time some particles of the broken pieces, until the calculus was ultimately removed. In using the crushing instrument, there was not only a difficulty to be overcome in getting it into the bladder, which could not always be accomplished, but a still greater in using it with the freedom and effect which is experienced in a tolerably healthy state of that organ; and no portion of small gravel would pass, except when the patient lay on the right side, which position was also necessary when any great difficulty in making water supervened. The presence of another stone was soon afterwards ascertained, of equal size with the former, but the suffering endured gradually wore the patient out, and he died exhausted.

On examination after death, the kidneys were found much altered in structure, and containing purulent matter. In the right kidney there were two calculi, as large as a full-sized pea, and a third had commenced its descent in the ureter. The bladder was much thickened, and diminished in capacity. A triple phosphate calculus, a little larger than a partridge egg, was lodged in a hollow behind the triangular space, from which it rarely appeared to move. The principal evil in the bladder had been originally caused, it is presumed, by the making of a false passage, which commenced on the left side of the verumontanum, penetrated the surface of the prostate and the bladder, passing between its muscular fibres and under the mucous coat, through which it entered, more than an inch from its neck. The orifice of the bladder was completely closed by a false membrane, so that a drop of urine had not for sometime, perhaps months, passed through it. This membrane extended some way backwards into the bladder, and forwards through the prostatic part of the urethra, and accounts for the urine flowing only when the patient lay on his right side, and for the difficulties the instrument for breaking the stone met with, which no change of position could overcome, and for the difficulty sustained in passing even the smallest pieces of detritus or gravel. The false membrane was as thick and as firm as chamois leather, and adhered firmly to the surrounding parts.

I am led to infer, from a due consideration of these and many other similar cases, that the canal of the urethra may be perfectly closed for a certain length of time but not by a spasmodic contraction of its muscular coat, provided even such muscular coat were known to exist; but, as this has not been ascertained, I prefer supposing that the obstruction takes place from inflammation of the internal mucous membrane, which alters its attractions and properties, assisted by an undue contraction of the elastic and outer wall of the canal, dependent on its vital elasticity or contractility. I believe this to be the case in all instances, except those alluded to in the commencement of these observations, in which an undue action of the compressor urethræ muscle may have produced the effect.

Children are sometimes affected by contractions of the passage; and although it is impossible to say that they may not occur in them from natural causes, I believe that they almost invariably takes place from accidental ones, being the consequence in fact of preceding injuries or derangements of the canal. The formation of a stricture is equally rare in elderly and old people, who are prone to suffer from other, although not less formidable complaints of these parts.

Permanent strictures are of two or more kinds,—those which are completely curable and those which are not; for in whatever manner the latter are temporarily removed, they are prone to return, and will return, without care is taken to prevent it.

The slightest perceivable alteration in an ordinary case is a mere thickening or condensation of the elastic wall, and constitutes the first step or stage between the dilatable stricture or the curable permanent, and the incurable one. The extent, great obstinacy, or narrowness of obstruction being no positive proof, although they may lead to a presumption of the more incurable nature of the disease; inasmuch as some of the most permanent cures I have effected, and which have stood the test of years, have been made where the obstruction was great, and the obstacle nearly impassable by the smallest instrument.

It has been said that strictures are formed by excrescences, caruncles, or tubercles, growing from the wall of the urethra. I have not seen, after death, irregularities of this nature of any extent. They rarely exceed the size of small projecting points or spots which appear to be caused by the common inflammatory process, and are most commonly observed near the neck of the bladder. I have however felt, on several occasions, a sort of soft obstruction, which always bled freely until removed, and which might have arisen from an excrescence of this nature; and I have seen several cases, in each of which an excrescence grew from the side of the urethra, from a quarter to about half an inch from the orifice. They resembled four or five granulations, adhering to and growing from each other, and were cured with some difficulty by pinching them with forceps, and applying stimulants to the part from whence they sprung.

These excrescences are more apt to grow from the female urethra, from its very edge, or from a little within. They are of a bright red colour, resemble a small wild strawberry in appearance, usually cause great pain, and always give much uneasiness. Sometimes they may be removed by applications of the sulphate of copper, the strong acetic acid, and by a solution of camphor in nitric acid. Where patients will submit to excision, I have always found the removal of the tumour by means of a blunt-ended pair of scissors to be the best method, dilating the urethra a little beforehand, if the augmented sensibility of the part will admit of it, so that the base of the little tumour, when cut off, may be touched by caustic, and the surrounding parts at the same time protected. The best caustics are the potassa fusa and the camphorated nitric acid. One careful application of a stick of well-made potassa fusa, cut to a proper point, will often suffice, and the neighbouring parts may be protected by washing them with weak acetic acid or vinegar, which neutralizes the caustic alkali. The camphorated nitric acid should be applied by means of a pen, a single drop being allowed to fall on the centre of the cut part, from whence any superfluous quantity may be washed off by the aid of a gum-elastic syringe and water.

The urethra may be generally, although slightly, thickened for a certain extent, and the surface of the internal membrane changed in its appearance and altered in its function, without any positive obstruction to the passage of urine ever taking place, and without much prospect of a perfect cure being effected. A gentleman came under my care, some years ago, with stricture five inches from the orifice of the urethra, through which a solid silver bougie could not be passed, although a similar-sized soft one could, and this peculiarity remained until his death. Whenever the canal contracted a little, a solid bougie would not pass; whenever it was dilated, so as to admit a No. 10, it would then pass, although not easily. This gentleman died of apoplexy, having been in the habit of passing a bougie twice a month or oftener, and of showing himself to me every year or two for a length of time, and I had the opportunity of examining the urethra. For the extent of an inch the canal was altered in colour and appearance, being yellower and rougher than in the remaining part, and the wall was a little thickened generally, but there was no especial gristly hardness at any one place; so that the disease, in all probability, arose from inflammation attacking the urethra for the extent of an inch, and giving rise to the described alteration for that distance. The sensation communicated on passing a bougie was that of its going over a rough inelastic surface for some extent, and the dissection proved the fact. The difficulty in introducing a solid sound, arose from the length of this inelastic part, and from its being beyond five inches, where the urethra is more firmly attached at and below the pubes.

In the generality of stricture cases, the state of parts is exactly the reverse; and the obstruction, in cases of long standing, which may have even proved fatal, may not exceed an eighth of an inch in thickness. It is often formed by a simple fold of membrane, of a semi-circular form, situated at the under part of the urethra, not even the sixteenth part of an inch in thickness. This is called a bridle stricture, and in the present state of our knowledge may be readily overcome and removed; but when, instead of running in a semi-circular, it takes a spiral or a more diagonal direction, amounting almost to a longitudinal course, of which I have seen two or three rare examples, the mischief becomes of a much more permanent nature, and is less amenable to art. The passage rarely, if ever, becomes impassable; but it is less susceptible of permanent relief, and always requires the periodical and cautious use of a moderately dilating instrument. When the stricture is of greater extent, it is usually believed that two or more points of inflammation have each given rise to contraction, and by frequent recurrences have implicated the intermediate parts, so as to cause them to become one whole; and at last, under repeated attacks of irritation, a large hard cartilaginous mass of disease is formed, not only of the urethra but of the surrounding parts; in which state it is almost incurable even by the knife.

The canal in front of a stricture does not seem to be influenced by it, as far as regards its permeability or elasticity. It remains in its natural state, unless affected by inflammation, although the actual surface or anterior part of the stricture itself is often extremely irritable, bleeding as well as being very painful on the slightest touch. When the obstruction has been great and of long standing, the urethra behind the stricture is often found much dilated, but it is not always so; and this dilatation, when it occurs, may take place in any part of the canal. It more frequently happens, or at all events is more often observable, when the obstruction is a single one, situated in the pendulous portion of the urethra. M. Civiale and Sir B. Brodie both relate cases in which the enlargement made a great prominence in the perineum, and was even punctured when retention of urine took place; and I have a preparation in my collection, in which a dilatation of this kind contained a stone. In two cases, in which I was able to remove the stricture, an enlargement of this nature almost entirely disappeared. In order to give rise to it, the obstruction must have been considerable, and the coats of the bladder must have gained in thickness and in power, in proportion as the contractile property of the urethra had been diminished. The bladder, under constant action and straining, thickens, diminishes in size, becomes irritable and impatient of its contents; whilst the urethra immediately behind the stricture becomes more irritable than before it. Little is wanting, in such cases, to give rise to complete retention of urine, the formation of abscess, ulceration at the irritable spot, the effusion of urine into the surrounding parts, and the death of the patient, unless the *science* as well as the *art* of surgery are brought to his relief. In three cases, which I have had the opportunity of examining after death, these evils were brought one by the impacting of a small calculus or piece of gravel in the posterior part of the stricture, the dilated part behind being as large as a small orange. This dilatation does not, however, always take place, more particularly when the stricture is immediately anterior to the membranous portion of the urethra: and the surgeon, when obliged to open this part in cases of obstinate retention of urine, must not rely too confidently on its occurrence.

## CHAPTER IV.

### SYMPTOMS OF STRICTURE.

The symptoms of stricture, like those of most other diseases not immediately affecting life, are often as slow in their progress, and as insidious in their nature, as they are appalling in their results. They are rarely present until after the age of puberty; are common from that period until after five-and-forty years of age; and seldom occur as the consequences of stricture afterwards: so that when an elderly man complains of symptoms of this kind for the first time, they usually indicate derangement of the prostate, the bladder, or the kidneys. I have a gentleman advanced in life, now under my care, who sent for me for a retention of urine, declaring he had no stricture; yet he admitted that his urine for thirty years had passed in a very small stream, and that he had had occasionally a stoppage of water. This was clearly a complaint of the urethra of long standing; and, on examination, I found a stricture at five inches and a half, which would not admit, for several days, the smallest bougie.

When a young man has suffered from a gleet, he is in all probability first alarmed by a partial retention of urine. From having been obliged to make his water on the first sense of desire taking place, and which he could not restrain for an instant, he finds he cannot pass it except by drops, or with great straining, or perhaps not at all. This usually occurs after a debauch; and is caused by a slight inflammatory thickening of the mucous membrane, and which admits of the urine being sometimes evacuated in what is called a full stream. On this point, however, persons are always deceived; they never duly estimate the size of the stream they formerly made, or now make; and when they are cured they always express their surprise at the difference which has taken place, and their astonishment that they should not have perceived the alteration. It is only when a very great change has occurred, that the sufferers are aware of the fact. The sides of the orifice of the urethra are slightly adherent in the morning, and the urine which passes first often comes from this cause in a double or forked stream, whilst at others it is quite natural. The desire to make it is more frequent, and the patient has to get up at night sometimes four or more times, instead of sleeping soundly the usual number of hours. The evacuation of urine is rarely accompanied by pain, unless the prostatic part of the urethra, or the neck of the bladder, are particularly affected. The more anomalous sensations differ much from each other. Some persons feel only generally debilitated; others suffer from flying pains in the hips, a sort of weight in the pelvis, with uneasiness in the perineum; and there is a very marked symptom which frequently prevails in irritable strictures, viz. a pain extending from the perineum down the inside of the left thigh, and which occurs very rarely in the right. Sometimes a drop or two of blood is discharged, particularly after nocturnal emissions, which become more frequent as the irritation increases. When the derangement has become more permanent, the stream of water becomes less, and the patient is sensible of the more frequent desire to pass it, and that it is a longer time flowing, although a smaller quantity is made at a time. He is also aware that he is obliged to repeat the attempt in a less space of time than formerly; for unless the bladder has become more than ordinarily irritable, the whole of its contents are not discharged, but only such quantity as relieves the urgency of desire. There is still a discharge, and it is often this that makes the sufferer apply for advice, rather than the other symptoms. When the disease is still more advanced, the urine flows in a very small threadlike stream, either twisted, forked, double, broken, or passes by drops, and the patient is even obliged to solicit and assist its passage by pressing with his finger in the perineum, and at the same time elongating the canal, something in the way, as a gentleman once said to me, a dairy-woman milks a cow. When the disease has reached this point, the bladder cannot empty itself, it becomes distended, and the urine passes through the neck into the urethra, behind the stricture. This part may have become dilated, and some water may remain in it, even when the bladder has ceased to act, and which dribbles through the stricture, keeping the patient wet, uncomfortable, often excoriated—an object of disgust to all around him. This symptom is sometimes experienced in a less degree at a much earlier period, but the younger patient complains only of the longer time he is obliged to occupy than formerly in getting rid of the last drops of water. This inconvenience sometimes remains when a man is apparently cured, and can pass a full-sized bougie with only a slight sensation when it goes over the part affected. It is expressively enough called *back water*, and it occurs either from there being a small bank of stricture remaining, or from that particular part, in which it was situated, having its natural elasticity impaired, or from the dilated part behind not having resumed its natural dimensions. It is therefore the last symptom to be removed, and it is never effectually done until every vestige of disease has disappeared. The straining, which is necessary to expel the urine through a very narrow opening, brings into action the abdominal muscles, and this often gives rise to a rupture, by which the maladies of the unfortunate patient are augmented, and he is obliged to encumber himself with a truss. His miseries are only, however, now beginning; the excessive actions of the abdominal muscles lead to a corresponding relaxation of the sphincter ani, and the fæces pass in small quantities involuntarily during the effort to pass water. The mucous membrane of the bowel protrudes, and this protrusion sooner or later, combined with bleeding piles, augments his distresses, which are even increased from time to time, by an irritation of the whole of the mucous membrane of the bowel, which sympathizes with the urethra, and occasionally causes a diarrhœa, that augments all his evils to a point almost unbearable, but which is often removed as by a charm, by anything which will allay the irritability of the stricture. In the early stages the irritation of the prostatic part of the urethra and of the neck of the bladder lead to the increased desire to make water, and ultimately to the establishment of chronic inflammation; these re-act on the diseased part of the urethra in front, and materially augment the mischief. The orifices of the prostatic ducts inflame and enlarge, and the inflammation extends to the glandular structure itself, even if it should not have been sympathetically affected previously; the emission of semen is easily excited, it is often involuntarily, and is attended by excruciating pain, and a dull heavy weight in the perineum, with an especial tenderness in the rectum when the prostate is touched. The irritable state of the habit is augmented, cold shiverings occur, followed by heat, the pulse becomes more frequent, the skin hot, the appetite is lost, the tongue is loaded, the secretion of the liver in such cases is principally deranged, and vitiated bile is often discharged in great quantities. The fever at last gradually diminishes, although it does not entirely subside, and assumes more of an intermittent type, but not before a greatly augmented discharge of matter from the urethra marks the opening of an abscess of the prostate into it; or a tumour in the rectum or perineum indicates its probable evacuation in these directions, the prevention of which must, if necessary, be assisted by art. The cup of misery is not yet full. The bladder, partaking of disease, may either be very much thickened and diminished in size, as well as acutely or chronically inflamed, or it may be augmented in size without being materially thickened. When the disease in the urethra has been acute in its symptoms, the bladder more often partakes of the first state; when the disease causing it has been slow in its progress, and situated at the neck of the bladder itself, or in the prostatic part of the urethra, the second or chronic inflammatory state is more often combined with it. The desire to make water is continual, the irritable state of the neck of the bladder and of the parts immediately adjacent allow scarcely a moment of rest, drop after drop of urine is passed with great agony, but only with momentary ease; and if pouches have formed in the bladder, every turn of the restless individual renders his desires more urgent, by emptying these pouches of their contents. Worn down by his sufferings, in the agony of despair he prays to God for his dissolution; and if it has pleased the Almighty to weaken his intellectual faculties, as it has been his will to afflict his bodily powers, he sometimes becomes forgetful of his duties, and seeks for a temporary solace in laudanum or other narcotics, the augmenting doses of which he hopes and expects may put an end to his sufferings.

The testes, at an early period of prostatic irritation, often become implicated. This occurs from the continuous propagation of irritation from the opening of the ejaculatory ducts into this part of the urethra. They become uneasy, then painful, and a little swelled. In warm climates the irritation usually terminates in hydrocele, with a softened and enlarged, or sometimes a hardened and enlarged, testis. In more northern climates, chronic induration more commonly occurs, and is sometimes mistaken for scirrhus. Some of the most satisfactory cures I have been the means of effecting in this branch of surgery, have been made in cases of this nature, and principally by removing the disease in the urethra.

When the obstruction to the passage of urine is nearly complete, the convulsive efforts made to discharge it bring on ulceration behind the stricture, the urethra yields, and is said to be ruptured. The bladder has been known even to burst, but this is of very rare occurrence. I have known it ruptured by a fall from a height when a quantity of urine was contained in it, but not solely from its own action, or from over-distention. When the urine is effused into the surrounding parts, from rupture of the urethra, a temporary relief is obtained, to be followed by more fatal symptoms. The surgeon may at the moment before this evil happens prove a guardian angel; one single thrust of a lancet in the proper direction may suffice, and the unhappy man, groaning in the utmost agony, is at once relieved, and placed in comparative safety. If this aid should not be obtained, the urine is forced into the cellular membrane with all the power of the bladder acting spasmodically: the patient is sensible that his urine is flowing from his bladder, he hopes he is passing it, as the accident usually takes place in a moment of intense agony, but on looking down, he perceives with alarm that the scrotum and the neighbouring parts are greatly distended. He is however for the time relieved, the extraordinary excitement of the bladder ceases; and as the pressure and irritation on the posterior part of the stricture are partly taken off, the urine may even dribble through it, exciting hopes which are not likely to be realized. The white colour and doughy feel of the scrotum are succeeded by a dark red erysipelatous hue, the cellular membrane beneath loses its life, and must slough away with its covering skin, under which, and indeed before this process is completed, the patient often sinks and dies. Mortification in such cases often rapidly supervenes; black patches appear in different places on the skin of the scrotum, the prepuce, and on the glans penis, the febrile symptoms are momentarily augmented only to be depressed, and the same symptoms of anxiety and distress, which supervene in all other cases of mortification, attend on this. The cessation of pain, the extreme exhaustion, the inexpressible anxiety of countenance, combined with clearness of intellect, mark in the most fatal manner the nature of the case; and the patient's expression of his sanguine hope of recovery is only interrupted by the dim shadows of approaching death, which cast a blueness and a film on surrounding objects, which he himself observes and complains of, and but too ineffectually attempts to remove; or if his powers have been more slowly exhausted, he gradually sinks into a state of coma, or low muttering delirium, and dies.

This rapidity in death is not always so great; the ulceration of the urethra may be slower in its progress, an abscess may form external to it or to the bladder, the contents are then discharged, either naturally or artificially, a passage through it is thus established for the urine, and several fistulæ in perineo above the pubes or in the groin are, or may be, the result. These abscesses, in middle-aged or elderly persons, or those of bad constitutions, are often attended with considerable danger. In such cases, the retention of urine is never complete, although the pain in micturition is great, and is felt permanently in the perineum, which is tender to the touch, and soon becomes hard. This is followed by an inflammatory blush on the surrounding parts, a higher degree of fever supervenes, cold shiverings mark the formation of matter; the pulse becomes as quick as it is small and irritable, the tongue gradually assumes a brownish colour, and is dry to the appearance as well as touch, the countenance changes to a dingy yellow, a reddish spot forms on the cheek; and if the abscess is not early opened, and relief in this way obtained, the patient equally, although less rapidly, sinks and dies before it breaks and discharges its contents, which are dark coloured, unhealthy, and fœtid, indicating the urinous participation in its nature.

In less serious cases, the febrile irritation is more moderate; the patient passes his water, although with difficulty, there is a sense of weight and pain in the perineum, accompanied by swelling or rather hardness at its upper part, which gradually advances to the surface, and as it progresses renders the passage of urine almost impracticable. The matter retained in situ by the fasciæ of these parts, which are strong and resist the ulcerative process, finds its way to the surface so slowly as to require the aid of the lancet. In some instances, urine is found mixed with the matter; in others pus alone follows the incision, although the urine escapes through the opening a day or two afterwards, showing that the abscess had formed and the matter had been discharged, before the urethra had given way by ulceration. In some instances, irritation followed by the formation of matter takes place external to the urethra, even when a large bougie can be passed with facility; and it is particularly important that an opening should be made deep into the swelling, in order that ulceration of the urethra should be prevented. An early opening is of the greatest use in these cases, from the relief of all the symptoms which follows; the patient declares that he is in heaven when compared with his previous state, and is rapidly restored to health, provided a fistulous opening in perineo should not be the result.

If an abscess, under any of these circumstances, should lead to any serious communication between the urethra and rectum, which is the effect of too great delay in obtaining a free external opening, in most instances in which it has taken place, the misfortunes of the individual are complete. For although I have known some instances of a cure being effected under these deplorable circumstances, the generality of sufferers have had to bemoan a miserable existence for the remainder of their lives.

I have a gentleman under my care, in whom an opening has taken place between the bladder and rectum without the formation of an abscess. His attention was first drawn to it by the expulsion of air, and occasionally of a small quantity of fæces, which colour the urine. The opening cannot be detected per anum; and the complaint, although a source of inconvenience to him, gives rise to no distress, but is not I fear curable.

In another case, the first sign of mischief was the formation of an abscess by the side of the rectum, which gave rise to a fistulous opening, communicating with the intestine, which on being divided would not heal, in consequence of a small quantity of urine which distilled through it each time the patient made water; and which did not entirely cease for a long time after the urethra was restored to its natural state.

Sometimes, an abscess which appears to be forming or formed in the perineum, or rather in that part which is covered by the scrotum, discharges itself into the urethra, and the patient gets perfectly well. But if the contraction and irritability of the urethra be not removed, or kept quiescent by the regular weekly or monthly use of the bougie, the irritation is likely to return at the same part, and another abscess to form, and so on in succession until it is opened externally and the parts within soundly healed from the urethra outwards, as in cases of fistula in perineo, to be noticed hereafter. This inconvenience is frequently caused by the urethra having been injured in passing a pointed bougie, or by the improper use of a cutting instrument.

## ON THE METHOD OF EXAMINING THE URETHRA.

The surgeon, in examining the urethra, should regulate his proceedings by the age of the person, and the symptoms under which he labours. If the patient is a young man, suffering but little, and making his water in a tolerable stream, a solid silver sound is the best instrument. It should be well oiled, smaller at the point than in the shaft, and of a size to pass very readily into the orifice; it is to be, in fact, not more than two-thirds of the size of this part. It should be introduced with the greatest gentleness, so that it appears to slip into and through the urethra by its own weight, rather than by the pressure of the hand. If the urethra is sound, the instrument will meet with no obstacle, give no pain, and only cause a feeling of desire to make water as it passes through the prostatic part of the passage, accompanied perhaps by a sense of faintness, but which will not recur after two or three trials. If it gives rise to soreness or pain, as it passes on, or rather over the part particularly affected, although its progress should not be interrupted, it shows by this the portion of the urethra which is suffering from chronic inflammation. If the sound stops at the spot, instead of passing over it, and only proceeds after a little pressure, it indicates a thickening of the mucous membrane, and a probable loss of elasticity of its external covering, constituting what is called a dilatable stricture. It is not often that a derangement of this kind is found after the first six inches; and when none is discovered in this space, the complaint, if any exists in the urethra, is in all probability in the prostatic part, or from seven to eight inches, or even nine, as the case may be. If the instrument should pass into the bladder without obstruction, but with a pain as it proceeds through the last part of the urethra, which is often so very severe as to make the patient exclaim not only of it, but of the desire to make water, the disease is in the membranous and prostatic parts, and may extend by continuity of structure to the neck of the bladder. In this case the solid sound should be laid aside, and the cure completed by the small soft bougie, which is to be carefully and very gradually increased to the full size of the orifice. If the sound is arrested at or about seven inches, and on withdrawing it and depressing the handle, it then passes over an obstacle into the bladder, the complaint is in all probability an inflammatory swelling, more or less chronic, of the transverse portion of the prostate. When the obstacle to the passage of the instrument exists at the very entrance into the bladder, which is known first by the resistance at from seven and a half to eight or even nine inches in different persons, and by the peculiar sensation communicated by it to the hand as it enters the hollow bladder, the elasticity of the neck of this organ is impaired, but not irrecoverably so. A young man with a narrow stricture can always make a stream of water, however forked or small, but in cases of this kind the patient will not only have a frequent desire to pass his urine, but will find it very difficult to do it; and even when a No. 12 can be passed, he will sometimes be unable to evacuate his bladder but by drops, and sometimes not at all. I have never seen this disease in a person under twenty-six years of age, and it is more common between thirty-five and forty-five; although, when once formed, it will often continue to distress the patient more or less through life, unless carefully watched.

When a young man has a slight permanent stricture, the sound if small enough, passes through it, giving to the hand of the surgeon the sensation of going over a ridge; and it is quite curious to observe how small an increase in the size of the instrument will often prevent its progress under any reasonable pressure. After a little time the obstruction may become greater, and the opening narrower, so that the instrument which passed on the first trial will not go through if any violence has been offered by the larger one. The face of the permanent stricture will not in fact yield; yet if a smaller pointed conical instrument be insinuated into it, it will give way by its inner circumference, but not by its surface; and a larger instrument will then go through without doing much mischief, if it does no good. If the bougie is momentarily arrested, but afterwards passes, on extending the pendulous portion of the urethra and thus putting it on the stretch, it has in all probability hitched on a fold; and if a small pointed instrument is used, and is arrested at a particular spot, whilst a larger and rounder pointed one passes over it, the obstacle is most likely caused by the enlarged orifice of a follicle, which may bleed freely, and a false passage will be likely to be formed if the use of the bougie should be continued. If the larger bougie passes over a spot which is exquisitely painful, and which bleeds, it may lead to the suspicion of an ulcer; and if much blood flows without any obstruction, or there is only a sort of hesitation, a soft fungous growth may have taken place from it, such as I have already described, but these growths are exceedingly rare.

When an elderly person is to be examined, who is known to have had stricture from his youth, there is no difference in the mode of proceeding; save that any stoppage of a small sized instrument, although it has gone beyond six inches and a half, must be viewed with great suspicion, as indicating the possibility of chronic enlargement of the prostate, which part should then be examined per rectum, and its enlargement, if any, ascertained. If this should be the case, and the stricture admits of it, a large catheter will be found to pass easily when properly borne against the upper part of the urethra and its handle duly depressed, when the stoppage of the smaller one will be satisfactorily explained.

If the elderly or middle-aged man has attended but little to himself, and only knows that he has been some time suffering from a derangement about these parts, but what he cannot tell, and has no knowledge of any disease in earlier life; the surgeon must be cautious, even in his examination with a solid catheter, which is yet preferable to a soft bougie. There is, in many cases of disease of the prostate, some sympathetic irritation at the bulbous part of the urethra, which will often offer considerable resistance to the passage of an instrument of a large size, and lead to the suspicion of stricture. If a large catheter is forcibly used, the urethra will resist; but, unless there really be a stricture of a permanent kind, this irritable spot will be readily passed by gentleness and judgment in the management of the instrument, when the true nature of the complaint will be easily discovered. If there should be a permanent stricture, which is either unknown to or only suspected by the patient, the steady and regular obstruction to an instrument of a certain moderate size, whilst one a little less will readily pass through with the usual sensation of riding over an obstacle, will demonstrate its nature.

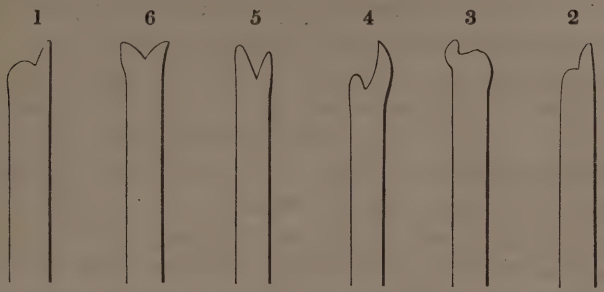
Strictures in the urethra, when neglected, are prone to give rise to disease about the prostate, if not of the gland itself; but I have known several gentlemen live to a very advanced age with narrow strictures, for which they regularly used bougies twice a week, without suffering this inconvenience; the stricture and the urethra becoming in most cases less irritable as the person approaches to old age. Persons having the true chronic enlargement of the prostate are not as commonly affected by obstruction in the anterior part of the urethra as might be, *à priori*, supposed; which is a fortunate circumstance, for the instrument which would go through the stricture would not go through the prostate.

The disease being ascertained to be stricture, the means of cure are to be selected. They are four in number: by dilatation, by caustic, by operations of various kinds, and by a combination of all these methods, as the particular circumstances of the case may at different times require; for both surgeon and patient should bear in mind that no one method of cure will succeed in every case of stricture in the urethra; and he will be the most successful operator, who shall be best able to adapt his means to the nature of each individual case.

## ON THE CURE OF STRICTURE BY DILATATION.

A stricture cannot be cured by dilatation until such time as a passage has been obtained through it sufficient to admit a small bougie; when one of a size that will pass without inconvenience is to be introduced, and allowed to remain for any time not exceeding an hour; and if the bougie is a little conical, the stricture may not only be completely filled by it, but moderately dilated. If the stricture is very irritable, the soft bougie may be grasped and marked by it, and the same thing will occur if the bougie be too large and too strongly forced into it. If the bougie is rather too large at the point, it will not proceed on meeting with the stricture, although sometimes, by a gentle pressure for two or three minutes, the stricture will gradually yield, and allow it to go through; but there is a probability that more irritation will follow this mode of proceeding than if a small one were first introduced for a quarter of an hour, and a larger one then made to take its place, which it will almost always readily do. This is, in fact, the principle on which dilatation should be conducted, and it will always be accomplished more safely and easily for the patient if done in this manner; for it is indisputable that a larger bougie can always be introduced if it follows a small one, than without such a precursor. The bougie should never be used as a mere dilating instrument oftener than every two days, and when the urethra is irritable only every three and sometimes four days. Proceeding in this manner the stricture gradually yields, and a bougie, whether made of plaster or of silver, having a proper curvature, and as large as the orifice will admit, will at last proceed through the whole passage without meeting with any obstacle; and it ought to be repeated at longer intervals, until the disposition for contraction seems to be removed, when the cure will often be complete. Where a stricture has been more permanent or of long duration, the patient should be taught the manner of passing it, so that he may use it once a week, then once a fortnight, and at last once a month or quarter. In this way I have made many most successful cures, even where the patient at the beginning of the treatment could scarcely pass his water; and there can be no doubt of its being the best method of proceeding when it proves successful, for the inner membrane of the urethra is restored as nearly as possible to its former and natural state. The question of the reproduction of mucous membrane has been much agitated, particularly by continental writers; but there does not seem to be any sufficient reason for believing that a reproduced part is so perfectly like the original structure as to resemble it in every respect, and particularly in its secreting properties.

When a bougie will not pass, and the greatly diminished stream of urine leaves no doubt of the existence of a narrow stricture, a smaller bougie must be had recourse to; and if the obstacle is evidently before the curve of the urethra, or five inches and a half from the orifice, the instrument, whether solid or soft, should be straight, the penis should be placed on the stretch, in a right line with the body, sometimes a little below, and at others above it, by which means, and after several trials with the point turned or gently bent in different directions, it may perhaps meet with the opening of the stricture, and pass through it. If these trials should fail, and too much should not be done at one essay, it will be necessary to take an impression of the face of the stricture, in order to discover where the opening is situated, by which means the point of the instrument may be more certainly directed to it. This is accomplished by means of a model bougie, the point of which is made of softer materials than the shaft. The point having been made sufficiently soft by heat, should be well oiled, and passed down to the stricture, against the face of which it is to be gently but steadily pressed. If the stricture, although narrow, is not very tough or permanent, it will sometimes yield, and the soft bougie will go through, when the point of a harder one only bends, twists, or turns back, the bougie having doubled on itself in the passage. If the stricture should not yield, the point of the model bougie does, and is gradually pressed into the sinuosities or openings on its surface; so that after remaining some two or three minutes, it may be withdrawn with one or more processes or marks projecting from the end of it, either acute or obtuse, as the case may be, and indicating the commencement of the true, and sometimes also that of one or more false passages. The experience of the surgeon will best enable him to distinguish between them, bearing in mind that the contraction or obstacle to be overcome is usually found on the under part, and that a channel in that direction is much more often a false than a true one.



Nos. 1, 2 and 3, are impressions taken by a model bougie of the face of three different strictures, and indicating the remains of the natural passages by the prominent points in each. The prominences in Nos. 4, 5 and 6, shew the remains of the natural passage and the commencement of a false passage in each, the edge of the stricture causing the hollow between the prominences.

The desired information being gained, and the size of the opening ascertained, its passage is to be attempted by a small sized instrument, of a firm material, whether of plaster, of catgut, or of caoutchouc, bent at the point to the right or left, so as to correspond with the situation of the natural passage on the model bougie, whilst the shaft may remain level with the under part of the canal. It is not, however, an easy matter to hit the small opening; and many efforts may be made in vain, until at last one better directed or more fortunate succeeds. If a bougie should pass into or through the stricture, it should be allowed to remain in for an hour; and if a catheter, it may be kept in altogether, unless the bladder is peculiarly irritable; and then it need not be carried into it, but be firmly fixed an inch beyond the stricture. This method is not, however, absolutely necessary, unless the passage has been accidentally made after many failures, and is often so inconvenient to the patient's pursuits that it cannot be adopted.

When the orifice of the urethra will not admit an instrument of a size sufficient to dilate the constricted part to the natural dimensions of the canal, the orifice should be divided by the iris knife, or small bistoury sold for this purpose; and if a short bougie of full size, with a conical point be introduced every morning for a few days, the enlarged orifice will remain open for the future. This practice succeeds, because the sides of the orifice possess their natural peculiar structure, and the inferior elastic part is quite cut through; but it does not succeed in a similar manner when the whole orifice has been eaten away by ulceration; it then contracts in healing almost to the smallest possible point, constituting a stricture at this part, which, as far as I know from personal observation, or from written testimony, is never cured by dilatation, although it may be relieved by division. When a person has such a complaint, he should always carry about with him a short silver tube, to be introduced for an inch whenever he wishes to make water, in the same way I am told the eunuchs do in the East, and who are called black, from the extent of mutilation.

When the orifice has been divided, and a larger sound can be introduced, a permanent cure is not always affected; for although a larger solid sound will go through the orifice, it may not proceed along the urethra without giving more pain than many people will submit to, and is therefore abandoned, the patient either changing his surgeon, or determining on putting up with the inconvenience. If this evil should not occur, the urethra may become generally irritable or inflamed from too great distention, an acute discharge is set up, and the bougie cannot be borne at all: or if this should not occur, it soon becomes apparent that this augmented dilatation is not sufficient to change the structure of the diseased part and effect a permanent cure, and that a greater dilatation cannot be borne generally by the urethra. Under such circumstances, I attempted to dilate the diseased part without dilating the whole, and to avoid the preliminary step of dividing the orifice to obtain room for the admission of the larger instrument. My first attempt in this way was by having a bulb made about an inch from the end of the instrument, which was small at its point, and gradually increased to the size desired, from which part it again diminished to a proper sized shaft. This gave very much less pain in passing than an instrument of the same size throughout; but I was soon satisfied that it was insufficient for all cases, and that in some a greater dilatation appeared to be necessary in order to effect a permanent cure than could be made by this method. In order to attain this object, I applied to Mr. Weiss, sen., who did not at first see how it was to be done; but on my mentioning that I wanted something which could be enlarged like Ruspini's ball-forceps, the application of the proper mechanism struck him at once, and he soon made me some instruments, which, although rude on the first essay (and these I have by me), soon became more efficient and polished in their appearance. They were composed of three blades, gradually separating by the action of a screw which turned in the handle. This same mechanism he soon after applied to a two-bladed instrument, and thus the forceps for removing a stone from the bladder made their appearance, and were first used with great effect, and were brought into notice by the late Sir Astley Cooper. I thought I had now obtained an instrument which could not fail of fulfilling all my expectations, and was only disappointed by finding it did too much. The opportunity of dilating was in general too tempting to be resisted, and the consequence was that it produced irritation in so many cases, that I was forced to give it up, having also fully satisfied myself that dilatation to whatever extent it might be carried, could not cure the worst kinds of stricture.

At this time I had under my care a little boy, who lived in St. Martin's Court, with a stone in his urethra apparently too large to find its way along the passage to the orifice; and Mr. Weiss made for me another instrument of a different kind, for seizing and drawing it through, which is in general use, both at home and abroad. M. Civiale even claims it as his own improvement.

Foiled in having a steel dilating instrument, I was much pleased with the idea of one made of softer materials, which was proposed to me by Dr. Arnott, to be dilated by air or water. When he first showed it to me, it was merely a piece of bladder fastened on the end of a gum catheter, but which, on attempting to use, I found would not pass along the urethra. The first improvement was the addition of a moveable piece of ivory, upon which one end of the bladder was tied, and which piece of bone fitted the end of a hollow gum elastic bougie, to which the other portion of bladder was carefully affixed. This ivory was soon changed for metal, and the bladder for the muscular coat of the gut of the cat, which is very strong and thin; but as this in one trial gave way, and the metal end was left in the urethra, the metal was now made to pass the whole length of the gum bougie, which was also changed for a metal tube. Thus far the improvements were made by me, and the instruments were used in my room, Dr. Arnott being present. He after this prosecuted his inquiries with his brother, Mr. Arnott, who in 1821 published his Observations on the subject, without mentioning the share I had taken in the matter. Nor would it be worth while noticing them now, if I were not desirous of showing the attention I have paid to the improvement of this part of surgery; M. Ducamp, a French surgeon, published a work in 1825, describing this instrument, and laying claim to it as an invention of his own, but to which it does not appear to me that he had any right as an invention, a similar one having been long known and used in England, as I have shown. As the gut became soft and yielded when wet, it became necessary to cover it with silk, or other unyielding material, and again with a smooth substance. In prosecuting my experiments, I soon found that filling it with air was a very uncertain process, and used water instead, which answered much better. In one case in which I used it, the bag slipped from the tube, and caused so much difficulty in withdrawing it, that my patient took alarm and left me; and in some others the effect was so uncertain, that it did not give the satisfaction I could wish. I do not now use instruments of this kind, either from their often failing, or being so troublesome, whilst they place the surgeon too much in the hands of the instrument maker, unless he has time and ingenuity to make them himself, and they are after all unequal to effect a cure in the more aggravated cases of disease.

## ON THE DESTRUCTION OF STRICTURES BY CAUSTIC.

The only caustics now used are the *argentum nitratum* and the *potassa fusa*. The potassa fusa had been almost entirely abandoned with respect to the urethra, until attention was lately drawn to it by Mr. Wade, and the argentum nitratum has fallen into unmerited obloquy and almost consequent disuse. The feelings and prejudices of mankind have been so greatly and effectually excited against the use of caustics, that they must be gradually allowed to subside. Like most other prejudices, they have some foundation in truth; but it is the *abuse* of caustics, and particularly of the argentum nitratum, and not the *use* of it, which has given rise to them. When a surgeon of reputation cures a number of patients by a particular remedy or remedies, his professional character is gradually, nay, sometimes rapidly augmented; more cases come under his observation, and many that are not susceptible of cure by the means he employs; he is nevertheless constrained, or nearly so, to use them, in order to satisfy the expectations of his patients; mischief ensues, and alarm is excited. This soon spreads, is fomented by the adversaries of the plan, and a mode of practice, which may be really successful in many cases, is often abandoned from prudential motives.

The argentum nitratum is nevertheless a valuable remedy, when properly and carefully used in appropriate cases. It has been supposed, 1st, that it takes off spasm and irritation; 2d, that it can destroy a long and narrow stricture; 3d, that it effects a permanent cure. The concurrent testimony of all writers establishes the first fact, and it is now almost the only object expected to be attained from its use. It is not capable of making a passage for itself through a long, narrow, and impassable stricture, which has become hard, gristly, and irregular, through time and repeated attacks of inflammation. The attempt to form a passage under such circumstances has been frequently followed by great inflammation, the formation of abscesses, of fistulous openings in the perineum, and between the urethra and the rectum; of inflammation and abscess of the prostate and of the bladder, and of profuse bleedings, which, with all or many of the preceding train of symptoms, gradually lead the unhappy sufferer to the grave. That the cure is more permanent than by the ordinary method of dilatation may in some cases be the fact, but on the whole it is very doubtful; and Sir E. Home, its great advocate, admitted in his later years and publications, the necessity for the occasional use of a bougie, in order to prevent a return of the complaint.

When it is intended to apply the solid caustic to the face of a narrow stricture, which I very rarely do, except to relieve irritation, a bougie should be selected *a size less* than the orifice of the urethra, properly armed by the maker, for the bit of caustic is apt to become loose, if introduced afterwards. The distance from the orifice to the stricture having been ascertained from previous examination, and marked upon the bougie, it should be oiled or greased, which latter is the best when caustic is used. A common bougie of the full size, or nearly so of the urethra, is first to be passed down for a minute or two to the stricture, to clear the passage, and when withdrawn, the caustic bougie is to be quickly passed, and the end or point in which the caustic lies and which is barely exposed, is to be pressed against the stricture for the space of a minute. The first effect is to coagulate the mucous secretion of the part, forming with it a whitish soft substance, which has often been mistaken for a slough. The second is by its stimulus to relieve and remove the irritation existing on the surface of the stricture, so that the person often feels much easier after a slight application, makes water in a fuller stream, and is greatly surprised to find that the desire he suffered from to pass it every hour or two has been materially relieved. Sometimes however the effect is the reverse, and particularly where the application has been too severe, or the irritation has been of a nature not to be relieved by it. The part becomes more painful, the desire to make water greater, whilst the passage of it is altogether obstructed, or it passes by drops with great suffering, until, by fomentations, opiates, etc., the increase of irritation and inflammation has subsided. It acts therefore sometimes like a two-edged tool, and this has been another reason for its disuse; but it partakes, on this point only, of the property which all other remedies have of doing the same, and the fact inculcates the necessity for the greatest care and gentleness in its use. When the application is steadily continued to the surface of the stricture for two minutes or more, its continued effect is that of a caustic, *viz.* the partial destruction of the part to which it is applied, which must be thrown off by the usual processes of inflammation and ulcerative absorption, which separate it from the living part behind. When the stricture is slight and thin, or narrow, this will in general be effected without much inconvenience; but when it is thick and hard it will not often be done easily, for the inflammation will cause a greater thickening of the part, and the occurrence of the long train of evils I have alluded to, if not prevented by proper means and a speedy abandonment of the practice. If, however, the operation should be fortunate enough to succeed, the separation of the slough from the diseased part is often marked by a paroxysm of fever, or the occurrence of an alarming hemorrhage. The rigors with which the febrile paroxysm commence are strongly marked, and I am sorry to say take place occasionally even before the slough separates. They frequently occur after every application of the caustic, or every one which has been in the least severe, and in such cases forbid its continuance. They are dependent on a particular sympathy which exists between the urethra and the system at large, and will occur as readily from violence, such as a cut or a tear, or a too rapid dilatation of the part by a large conical-shaped instrument, as from the application of any caustic whatever. I know a medical man who had suffered from Walcheren fever, and who almost invariably had a paroxysm whenever caustic was applied, or a large bougie was used so as to cause irritation; and the first paroxysm was always followed by others at regular intervals, so as to reproduce his Walcheren ague, which was only cured by the administration of bark, etc., in the usual way. This evil sometimes takes place in a less marked manner; and whenever the return of an irritation or pain is periodical and regular, quinine will in general, in combination with bark and opium, be found the best remedy when exhibited between the return of the paroxysms. When the first paroxysm of fever is about to be produced in consequence of the irritation caused by the introduction of too large a bougie, the desire to pass water is urgent, the patient is often incapable of doing it but in a very small stream or by drops, and the accession of the cold fit shows the course of the affection. This will be best alleviated by a grain or two of opium and ten grains of camphor; but the most efficient means of preventing a return of the paroxysm, if the pain and irritation should continue, will be to pass a small elastic gum bougie through the stricture, and fix it in the urethra for a few hours. The irritation in the urethra which gives rise to these rigors, sometimes takes place although more infrequently, after the pressure has been taken off which a catheter had caused by being permanently retained in the bladder for several days. The evil must be occasioned, in these cases, by the urine passing over the irritable spot, which in contracting on the removal of the pressure has become more sensible to the stimulus of the urine, which had not passed over it in any quantity whilst the catheter was in the bladder. The introduction of a small elastic catheter will remove this inconvenience, and some days ought to be allowed to elapse before the size of the dilating instrument should be augmented, and it must then be done in the most gradual manner, or a return of the febrile irritation will certainly ensue, and the cure of the patient may be indefinitely protracted.

Dissatisfied with the application of caustic to the face of a thick and narrow stricture, I was more than twenty years ago induced to try the effect of its application to the internal surface, by introducing it into the stricture. My attempts did not succeed in so satisfactory a manner as I could have wished, the caustic rarely doing enough to be effective. The method I adopted, was to introduce a hollow silver tube into the stricture, with a single eye, which was placed in a narrowed part of the instrument, half an inch from its extremity, so that the sort of bulb thus formed, on being passed through the stricture, might, by catching or drawing it back, bring the hole or slit in the narrowed part or neck of it, just opposite the internal surface of the stricture. Into the tube a platina wire was passed, carrying at a proper distance from its extremity a piece of caustic, moulded with a hole in its centre for the wire and duly secured, and it looked as if it would act well, but it did not do much; and as I rarely have recourse to caustic, it has been of late altogether disused. In 1825, M. Ducamp, of Paris, dissatisfied with his dilating instrument, to which I have alluded, page 76, published a method by which the argentum nitratum was to be applied to the inside of a stricture also, and he was led to believe that he could accomplish this object, however small the opening might be, provided it was passable. A model of the face of the stricture having been first taken, and the opening being ascertained by a portion of the modelling composition having entered into it; a hollow gum elastic tube, graduated by inches and lines, was passed down to it, having an opening at the end, and the openings were not all made in the centre of these instruments, but as far as could be imagined they corresponded with the openings which might take place in the face of a stricture; or one was made for each particular case. Through this opening a small spoon or curette was protruded by a stillet; and as it had been filled with argentum nitratum in powder, which was afterwards melted by the flame of a candle, he hoped it could then be safely applied to the inside of the stricture. It was found, however, to be difficult of application, indeed it frequently could not be applied; the curette, with every care that could be taken, would not enter the stricture, and the caustic was wasted on the surrounding parts.

M. Lallemand, in order to prevent this evil, made an alteration in the instrument, which brings it nearly to one of the ancient English ways of using the argentum nitratum. It is to introduce the caustic on a stillet through a tube or hollow bougie, so that when the armed stillet is duly placed in the tube it looks like a common bougie. This is to be introduced into the stricture according to a measurement previously made, when, by withdrawing the tube, the stillet being held perfectly steady, the end of it, which is defended by a small button forming the extreme point of the bougie, remains, and the caustic, contained in a similar spoon or curette to that of Ducamp, is exposed, and ready to be turned to any part of the circle which may require its application. This mode of proceeding is much more simple and easy of execution, as well as more effective, than the other. It is liable, however, to this particular objection, that it cannot be used until a bougie of the size of No. 3 or 4 can be passed through the stricture, the effecting of which constitutes the principal difficulty in the cure, whilst all the other objections against the use of the caustic, except that of making a false passage, remain in full force.

M. Lallemand says he has applied caustic in this manner to all parts of the urethra with success, and in one case he particularly specifies as far as the neck of the bladder, at a distance of nine inches and a half from the orifice of the urethra, which was, however, naturally a long one. The relation of this cure, from page 60 to 91 of his work, is very interesting, and his subsequent remarks on the use of the argentum nitratum in diseases of the prostatic part of the urethra are deserving of attention.

M. Lallemand, not satisfied with the certainty of the application of the caustic by this method, proposed another, which was to introduce into the stricture a hollow elastic bougie having a hole on one side near the end, into which he could pass another which fitted exactly, having affixed in it, opposite to the hole existing in the first or hollow instrument, a piece of caustic, which might in this manner be safely applied to the inside of the part affected. This method of proceeding I had invented and tried long before M. Lallemand wrote or had practised it. The instruments I had made were shown at my lectures five and twenty years ago; they are still in my possession, but they did not answer my expectations. They were as difficult of use and as impracticable in their application as those of Ducamp in the cases in which they were most wanted, and in the others, when they were efficient, were alike open to all the objections which are generally urged against the use of caustic.

I have for many years restricted my efforts with the lunar caustic to its admitted utility in removing that degree of irritation in a part which approaches to inflammation, and having long since found the great advantage to be derived from it in the form of ointment in chronic inflammation of the inside of the eyelids, I use it in almost a similar manner for the removal of irritable spots in the urethra. I have for this purpose a hollow elastic bougie, made round at the point, and of the same size throughout. Within an inch of the end, a round or oval hole should be made as in a catheter, and the part beyond the hole and up to the point should be filled up. Into the hole a quantity of the unguentum argenti nitratis* is to be introduced, and when the hole of the hollow bougie is opposite the irritable spot, the stillet made of whalebone is to be pushed down or home, having been previously so within an inch, when the ointment is forced out into the urethra, to the surface of which it is to be applied by turning the instrument half round, or by passing it backwards and forwards. The quantity used must depend on the judgment of the surgeon, and the age of the ointment, which is always milder in its effects, from the decomposition which takes place as it becomes older. It gives no pain at the time of application, although it sometimes causes a heat and a slight sensation, to be shortly afterwards followed, in most instances, by great relief. It does not however answer in all cases, and is not recommended as a universal remedy for them, although I have never seen it do mischief. It is very efficient when properly applied in some of the worst of those cases which Lallemand has described, but which are so rarely seen in England, as affecting the posterior part of the canal, accompanied by unknown or almost imperceptible emissions of semen, which may be found in the urine. It is equally, indeed more useful in chronic irritation of the anterior part of the urethra which remains after a gonorrhœa, when it may be applied on the surface of a soft bougie, and will often effect a cure when all other means fail.

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* The unguentum argenti nitratis is made of ten grains of finely powdered argentum nitratum, rubbed carefully up with one drachm of ung. cetacii and fifteen minims of the liquor plumbi diacetatis.

With reference to the assertion that the use of caustic is followed by a more permanent cure than when any other mode of proceeding is adopted, much reservation is necessary. When the whole of the diseased part is destroyed by it, and was not originally of much extent, I am inclined to believe that the statement is correct; and that there is less liability for a return of the complaint, than when the cure is accomplished by mere dilatation. When the disease has been of long standing, and of some extent, the superiority claimed for the caustic cannot be admitted. I have had many gentlemen under my care, who had the argentum nitratum applied, forty, thirty-five, and thirty years ago, by Sir E. Home, and since that time; yet they all have strictures at the same place where they then existed, and which were supposed to have been cured. Being now advanced in life, they are satisfied to use a small bougie, from time to time, which keeps the passage open, and prevents any serious inconvenience from taking place.

The *potassa fusa*, or *caustic alkali*, was introduced by Mr. Whately, and used in very small quantity, not exceeding the twelfth of a grain, as a substitute for the argentum nitratum, and with the view of removing the irritability usually attendant on a stricture, rather than for the destruction of the gristly hardened part composing the obstruction, or stricture itself. It was afterwards used in larger quantities for the removal of the whole of the diseased part, and failed in effecting this object. Mr. Wade has lately endeavoured to bring it again into notice by regulating the quantity used, and the periods for using it, in a more precise manner, and has related several very good cases of its successful application. It is, however, when used in sufficient quantity as a remedy capable of destroying a stricture, open to all the objections which have been urged against the argentum nitratum. It is said by its advocates to be less potent; but this can only be the case when used in small quantities; and that its good effects take place more from its promoting absorption of the stricture than by the destruction of its fibrous or cartilaginous structure. A small piece of potassa fusa, newly made, not exceeding half a grain in quantity for ordinary purposes, and never more than a grain when the parts are little excitable, should be lodged in a hole made in a soft round-ended bougie, and well covered in, particularly on the under part, that the caustic may not escape when the bougie is pressed against the obstruction. The bougie thus armed, and of a moderate size, should be preceded by a common one; and the distance having been duly marked upon it very carefully, it should be quickly passed down to the stricture, against the face of which it should be steadily but gently pressed, for the space of one, at first, and for two or three minutes afterwards, according to the irritability of the parts, and the effects produced on trial. The application should be repeated every three, four, or five days, or as soon as the irritation produced by the previous application has subsided. The effects of the potassa fusa, which are so marked as a violent caustic when applied externally, are modified when introduced into the urethra in small quantity, by the property it possesses of combining with the mucus of the urethra, and forming a sort of soapy compound, which protects the part against which it is applied, and renders its action more mild. I gave it a fair trial many years ago, both in large and small quantities, as an allayer of irritability, and as a remedy destructive of hard and gristly parts, but did not find it equal to the argentum nitratum in removing irritation; and it is not a more certain remedy in difficult and serious cases, whilst it was open to nearly all the objections which are urged against the use of the argentum nitratum. It is, however, on the whole, a safer remedy when used in small quantity, and in some cases will take off irritation remarkably well. It is also an apparently mild method of proceeding, suits some persons well, who are naturally fearful; and in the hands of Mr. Wade appears to have been so far successful as to merit a restoration to practice in many of those cases to which I have alluded.

Hemorrhages from the urethra, after the application of caustic, are caused by the sloughs separating and leaving the cells of the corpus spongiosum exposed, or by the ulcerative process extending to some small vessels, the canals of which are partially opened. These, it is said, cease of themselves, although not until a great loss of blood has been frequently sustained, and it has been recommended to let the parts alone. I apprehend, however, that they should be met and treated like hemorrhages from the same place from other causes.

The most alarming hemorrhages I have met with occurred from common causes, and were arrested by pressure on the perineum. A gentleman living in Cockspur-street had had a catheter passed by a surgeon of great reputation and ability in the morning, without either pain or inconvenience. On his return home he found there was a considerable oozing of blood, an accident which may readily happen without any undue force having been applied, which continued during the day, and induced him to send in the evening for his surgeon, who was unluckily out of town; the bleeding increased in the night, and in the morning early I saw him. There were several tubs of ice and water in the room, all apparently containing a considerable quantity of blood; his face was deadly pale, the pulse scarcely perceptible; and he said he had bled a pailful, which was of course an exaggeration. The bleeding was arrested in a few minutes by pressure, and did not return.

A tradesman had passed a common soft bougie for himself, the point of which had caught on some small opening, and it is presumed, had penetrated into it; he bled for two days and two nights, when I was desired to see him in Paddington-street. I found him kneeling in bed, and straining violently to pass his water, but which came with great difficulty, as the bladder contained a good deal of coagulated blood, which had passed backwards into it. He was as white as a sheet, and fell back in his bed, nearly insensible, almost as soon as I entered the room; having, as he said afterwards, passed several quarts of what (as it all coagulated) he considered to be pure blood; but as urine and blood coagulate together when out of the body in equal proportions, it is probable that only half of it was blood. This bleeding was also arrested in a few minutes by pressure, and did not return.

For the purpose of knowing where to make the pressure, any light, flat, and narrow, but firm substance should be prepared, such as a piece of cork, which can always be procured. The patient should then force all the coagulated blood out of the urethra; and as the bleeding usually takes place in these cases from that part which is anterior to the triangular ligament, pressure can readily be made upon it externally; but as it might be made a little before or behind the exact spot, in either of which cases it would be useless, the selection of the spot must be carefully attended to. This is done by beginning as far back as possible, and gradually bringing forward the finger by which the pressure is made. At a certain point the flow or dropping of blood will be arrested, and the precise spot from which it comes will be in all probability a little behind where the finger rests; a fact which can also be easily ascertained by carrying the finger a little backwards, when the blood will again flow. The bit of cork or pad can now be duly placed, and the patient should be desired to make pressure on it himself, which he can often more readily do than an assistant.

When the edge of a stricture is abraded by the pressure of a bougie, it will often bleed so profusely as to give rise to some uneasiness on the part of the patient, although not easily alarmed. This more often takes place when a false passage is about to be formed, at the outer and under edge of the stricture. A bougie for instance of the size of number three, will go over the stricture, communicating a slight jerk to the fingers, but on attempting to pass a number five, it may be arrested by it. If sufficiently soft to receive an impression, the end is marked by a line cutting it into two parts as in figure 6, page 73, and a considerable discharge of blood, from the under part of the stricture, which is abraded and irritable, may follow its withdrawal. In the last case of the kind which I had under my care, I removed this difficult point and the hemorrhage by keeping an elastic catheter in the bladder for four days, when a number eight sound would pass easily; the obstruction being scarcely to be felt with an instrument of that size. The gentleman felt he had become the master of his complaint, and preferred going abroad, where he had particular business, to remaining at home to have his cure completed.

The division of a narrow stricture of this kind by the knife or by caustic, often puts a stop to the hemorrhage at once, by permitting the vessels to contract; but there is oftentimes a disposition to bleed in these parts from slight causes, which is often troublesome, and gives rise to much inconvenience, without any peculiar change of structure having taken place, although I have never met with a case of this kind I could not overcome. Mr. Stafford has related one in which it was found, on dissection, that a nipple-like vascular substance projected into the canal, and which bled profusely on the slightest touch, through the centre of which there was a small canal, admitting nothing larger than a bristle to pass through, and affording the only exit for the urine. This substance, being anterior to a long and narrow stricture, could only have been removed by a division of the part; and there can be no doubt of the propriety of such an operation being done; the only question is, as to the manner of doing it, which will be hereafter considered.

The division of a stricture, at the part where the urethra passes through the triangular ligament, is capable also of giving rise to a disagreeable hemorrhage. An Indian officer had long suffered from a permanent stricture, which may be called elastic, from the readiness with which it could be dilated, and the facility with which it contracted, if the bougie were omitted for two or three weeks; and having tried the ordinary means by dilatation, without any permanent success, I was induced to divide the stricture, which was very carefully done by two operations. He suffered no inconvenience from the division, except a trifling rigor; but on passing a silver sound two days afterwards of the size of No. 11, and which had gone through the part frequently when it had been dilated, a considerable hemorrhage followed; and a retention of urine took place, accompanied by very severe rigors. The flow of blood was not so much forwards, as backwards into the bladder, which became filled by it, and he was in great agony. The strictured part had become inflamed, and was so highly irritable that a small silver catheter could only be passed through it with great difficulty when a part of the coagulum was washed away. Many days elapsed before this gentleman was restored to his previous state, but the relief has been more permanent, and he can now pass No. 11 with ease.

Hemorrhage, caused by a rupture of the urethra, in consequence of a fall on a post or gate, or other narrow substance, often gives rise to troublesome symptoms, and usually to the worst kind of stricture, unless carefully attended to. When the bleeding from the urethra points out the mischief which has taken place, a moderate-sized gum elastic catheter should be passed into and retained in the bladder, so as to prevent any infiltration of urine into the perineum or scrotum; or if this should have taken place, small incisions must be made for its evacuation, and it should be carefully pressed out if possible; but if a catheter cannot be passed into the bladder, or if matter should form, an incision should be made clearly and distinctly down to the ruptured part, so as to allow the urine or pus a free passage through it, and the use of the catheter should be continued; or a solid bougie should be passed from time to time, until the urethra shall have healed, without the formation of a stricture, which may in this manner be prevented.

When the hemorrhage comes from the prostatic part of the urethra or neck of the bladder, cold water, rest, and an opiate will suffice to stop it, provided it has been caused by some accidental circumstance, and does not arise from disease of a malignant nature; in which cases nothing can prevent its return, or even its continuance.

A gentleman sent for me, having passed a bougie for himself, which he was sensible was not only a little larger than his usual size, but that it had also caught on some fold at the entrance of the bladder, and had passed it with a jerk; a continued bleeding was the consequence, accompanied by an urgent desire to make water, but which appeared to be blood, or nearly so. The desire soon became more urgent, and the difficulty of passing any thing greater, until at last complete retention ensued. There appeared to me to be two evils: one, retention of urine from having passed too large a bougie; the other, hemorrhage and irritation of the neck of the bladder from having abraded a spot on its surface; and which was augmented by the sympathy which always exists between it and any very irritable part of the urethra. In order to relieve the retention, I passed a small gum elastic catheter, which drew off a quantity of bloody urine, and removed the irritation and desire existing at the neck of the bladder. I then directed an opiate to be given, and that he should shortly go to bed; and although some blood oozed from the urethra, and he passed dark-coloured bloody urine for twenty-four hours afterwards, indicating that some blood had found its way into the bladder, the bleeding did not return; and I attribute the subsidence of it very much to the quietude of the bladder after the distress had been removed by the passing of the catheter. When a hemorrhage takes place into the bladder, from a rupture of the urethra, the consequence of a blow or of any other cause filling it up so as to create great distress, the proper practice to be pursued, is to inject the bladder with warm water through a catheter with a single large eye on the side, and a hole at the end; or by a double catheter, by the motions of which, in the first instance, the large coagulum may be in some degree broken up, when it is more readily dissolved by the water, so as to leave the urine quite clear in a few days, provided no more blood is poured into it.

When the hemorrhage does not take place from any distinct accidental cause, it may be difficult to ascertain from whence it proceeds. An old medical friend of mine passed occasionally dark bloody-coloured urine, which gave him much alarm, and on account of which he had also consulted several gentlemen, eminent for their knowledge of these diseases. The blood was supposed to come from the kidney, and that it was really blood was readily shown by coagulating a small quantity in the urine by the application of heat, and he took many kinds of medicine in consequence, without effect. As some little difficulty seemed to exist on the first attempt to evacuate the bladder, and as the bleeding might arise from the irritation caused by a small stone, it became necessary to examine the urethra and bladder. Nothing could be made out, save a slight difficulty on entering the neck of the bladder with the sound No. 12, and which part offered a positive obstruction to No. 14, surmountable only by a little management of the point of the instrument. He had, in fact, the bar or dam I have pointed out as occasionally forming at this part, independently of any disease of the prostate. He soon found that his urine remained clear for many days together, and that he could always cause it to be a little bloody, either by passing a large bougie, or by a little more than his ordinary exercise; he therefore acceded to my original opinion, that the blood oozed out from some enlarged veins at the neck of the bladder. He can now pass No. 14 through it with ease, and is free from hemorrhage; he therefore only uses the solid silver sound occasionally, and has abandoned all internal medicine. I was led to believe that the veins of the neck of the bladder were enlarged, first from there being obviously some derangement of structure as well as of function at the part; and from perceiving that the veins of the nose, as well as those of the glands and prepuce, were very blue and tumid, appearing as if they did not truly transmit their blood through them; and it struck me that those of the neck of the bladder might be in the same state. The sound only did good, or does good, by preventing the increase of the bar, and thereby rendering an undue action of the bladder unnecessary. The part is in fact at rest.

John Warner, ætat. 42, a brass-founder, came under my care in the Westminster Hospital, June 1833: has had gonorrhœa eleven or twelve times: has served as a marine twelve years, four years in the West Indies, and four and a half in the East, but was never affected with any of the diseases of the country: is not married: has not received any injury to the spine or abdomen, and does not suffer from pain in the back or above the pubes: he has suffered from bleeding of the bladder at occasional intervals for ten years; when it first came on he had a discharge, which he concealed, and for which he was not taking any medicine; he then went, on account of the loss of blood, under the care of the medical officer of the navy at Chatham, by whom he was attended for three or four weeks, and then discharged, being told at the time of his dismissal that he had a diseased bladder and stricture. The hæmaturia after a time left him, and he continued well for six or eight years, when a drinking bout brought it on again. He was admitted into the hospital for retention of urine, which came on also after drinking to excess, to which he is rather partial; this was relieved by passing the catheter. When the bladder is so far distended as to require its evacuation, it causes so much pain that if he is asleep it wakes him; he is immediately relieved by emptying it, and he cannot retain his water long, in consequence of the pain it gives him, which is chiefly felt near the frænum preputii, the evacuation being followed by scalding. The hemorrhage has returned only within the last few days, and he thinks he loses a pint of blood daily; the fluid, when first evacuated, is of a bright red colour, as if it were all fluid blood, but after standing a short time a separation takes place, and the blood coagulates and falls to the bottom of the vessel. The stream of urine has generally been of a good size, and never twisted or double. Tongue clean; bowels open; appetite good; pulse 86, regular, but neither jerking nor hemorrhagic; sleep disturbed.

On examination a slight stricture was found in the urethra. The shape of the clots of blood were round, indicating that they were formed in the bladder; those of a vermiform shape more often coming from the kidneys, or taking the form of the ureter in their descent through it. An elastic gum catheter, with one eye, was passed and retained, care being taken that it did not exceed the commencement of the urethra more than one inch, for fear of injuring the coats of the bladder, but that it should be passed full an inch, lest the eye or hole should irritate the neck of the bladder, for which reason catheters are sometimes made with a hole at the end only. A common bladder was attached to it to serve as an external reservoir, into which the fluid might continually pass, and without effort, so as to prevent any accumulation and distention of the natural bladder. He was also ordered the compound infusion of roses, with the sulphates of alum and magnesia three times a day, and to be kept perfectly quiet.

The first night after the instrument was passed he could not keep it in, in consequence of the pain it gave him, and was rather sulky when it was replaced; he did not at first approve of the second, or adventitious bladder, which he thus carried about with him, but soon became tolerably reconciled to it, as he slept well, being undisturbed by the notice to discharge his urine. After the lapse of five days the external bladder was removed, as it was found that he could retain his urine three or four hours without pain; and a catheter was introduced and plugged, so that its contents might be drawn off every hour. In a fortnight the catheter was altogether removed, and in a month from his admission he was discharged cured. As much good was done, in this case, by keeping the bladder perfectly quiet, and preventing as far as possible any action of it, by allowing the urine always to flow through the catheter. It is a mode of practice I have followed in other cases with success; and if the sulphuric acid and alumen had not proved beneficial, I should have substituted for them the powder of galls and opium, in imitation of Ruspini's styptic, which is supposed to be made of these articles, and which I have known to be advantageously used in these as well as in other internal hemorrhages, particularly from the kidney, and in those which occur in females. It is in cases of this nature that an injection of alum and cold water into the bladder is often so effectual.

When hemorrhage from the neck or other part of the bladder is derived from a malignant disease, the malady is, as far as our knowledge now extends, incurable. The patient in these cases is first alarmed by his urine being tinged with blood, which sometimes disappears and returns for a considerable length of time, without becoming serious. As the malady advances, the urine becomes thick, mucus from the internal coat of the bladder is deposited as well as blood, and small threads of medullary matter may be observed in it. The urine is almost always bloody, and blood is discharged in large quantities, in round and irregular shaped clots, which often stop the passage, and are sometimes moulded to the form of the canal. The urine becomes at last highly alkaline and offensive, and the presence of portions of decayed animal matter sufficiently attest the existence of medullary disease.

Mr. Stafford, believing that a stricture might be divided internally with advantage, invented an instrument for doing this, which answers in some cases remarkably well; although it is, and always must be, a two-edged tool, capable of doing much good and much mischief. It consists of a round graduated hollow silver tube, either straight or curved, like a common catheter, containing a stillet, having a lancet-shaped cutting point at one end, and a handle at the other. This and other instruments somewhat of a similar description, are used in the following manner. The exact distance of the stricture having been ascertained, by two or three previous examinations, the cutting instrument is to be passed down to it, and made to rest steadily upon the contraction, when the lancet point is to be pushed forwards, and thus made to incise the stricture. The lancet or cutting end is drawn back by the spring, which ought always to be concealed within the tube, the blunt point of which should then be carefully urged forward; and when it has entered between the edges of the cut part, he directs the lancet point to be again protruded, and the blunt point again urged on, and these operations to be repeated in turn, until the stricture is perforated or divided, when a gum elastic catheter is to be passed into, and allowed to remain in the bladder.

When this instrument succeeds perfectly in effecting the objects intended by it, the cure is often more permanent, and is usually effected in less time than by any other means; but the cases should be well selected, and the instrument must be carefully used, or greater mischief will ensue than from any other of the methods of cure in ordinary use. I would not permit it to be used on myself unless I had the greatest confidence in the friend in whose hands I placed it, because I know that neither anatomical knowledge, the greatest ability, nor practice in handling it, can prevent many of the serious consequences that must inevitably ensue from time to time, from circumstances which the operator cannot control. Considered as an additional and powerful means of cure to be made use of in aid of those in present use, it merits great commendation; but it is more easy to make false passages, to cause abscesses, hemorrhage, and effusion or extravasation of urine into the surrounding parts with it, than by any other of the means commonly employed, except by absolute force. These are however objections rather against the *abuse* of the instrument than its use; the evils enumerated, must however occur occasionally in the ablest hands, although they may generally be obviated by some modification in the use of the instrument to be hereafter noticed. If I were however to say that it were not liable to cause accidents of this nature, I should say that which I knew not to be true, having known them occur in the hands of the very ablest men.

The object professed by Mr. Stafford, of dividing the inner edge, or internal circumference of a cartilaginous stricture, by a small perforator, of the size of No. 4, in order to effect a cure, will not be effected, although it may make a passage. The radical cure, that is, the prevention of the return of the contraction, is only to be accomplished by the removal of the outer part of the obstruction, as well as of the inner, when more than the actual membrane of the urethra is affected.

When the canal is permeable, and the stricture is very contractile, as well as irritable, giving rise to considerable inconvenience, and requiring a constant attention in passing the bougie on the part of the patient to prevent further mischief, the division of the irritable part often does much good; but then the instrument used should be of a good size, so as to fill the passage tolerably well, and this proceeding should rarely be resorted to until the surgeon is quite sure of being able to pass an elastic catheter into the bladder, by which alone, the rigors, pain, etc., which will almost certainly follow, will be prevented. I have had the opportunity of examining the urethra after death, in two persons, in whom this mode of proceeding had been resorted to, and in both, the urethra appeared to have been restored to its natural state. I have examined the bodies of three others, in which the deaths of the patients seemed to have been hastened by its adoption, in consequence of an extravasation of urine, which the use of the instrument had not prevented, if it had not even caused.

When the obstruction has been the result of disease of many years duration, or of mechanical injury, and a portion of the bulbous part of the urethra, under the pubes, has become hard, gristly, tortuous, and nearly impervious to the extent of an inch or more, the operation of cutting out the part, and of making a new urethra, was recommended and practised by our forefathers with very indifferent success. It is to be done by making an incision in the left side of the perineum, nearly in the same manner as in the operation for the stone; the diseased portion of the urethra is then to be opened or dissected out, and a catheter is to be passed into the bladder, over or around which a new piece of urethra is to grow, until the passage is reinstated in all its integrity. I have done this operation, and have seen it done several times; it is infinitely more difficult of performance than that for the stone, and has more often failed altogether of being accomplished in the hands of the very best surgeons. It is always a long and laborious operation, is most painful and distressing to the patient, and is conducted on erroneous principles. It is, nevertheless, the operation which most of the young men of the present day, who have just completed their studies, say they would do in such cases, although not one in twenty would succeed in doing it, if they were to try. It cannot therefore be too thoroughly reprobated or condemned, and ought to be entirely abandoned in practice, as utterly worthless. Sir B. Brodie has recommended a modification of this method of proceeding, with the view of superseding it, and I have proposed and practised another, founded on different anatomical considerations, both of which will be considered in the next chapter on the Treatment of Impassable Stricture.

# CHAPTER V.

## ON THE TREATMENT OF IMPASSABLE STRICTURE.

When a stricture is impassable by the bougie, but is permeable by the urine, although it flows with difficulty, and there is no urgent necessity for the immediate removal of the obstruction, two different modes of proceeding may be adopted for its cure; one by a long continued and equable pressure, made on the face of the stricture by a pliable hollow gum elastic bougie, with which I have usually succeeded in overcoming the obstruction when not of any great extent; and of effecting a passage into the bladder, without giving rise to the alarm and anxiety which more vigorous measures sometimes occasion. The other, by steady pressure made for a short time at intervals with a solid instrument, until the obstruction is gradually overcome.

It might be supposed that the continued presence of a bougie would give rise to a greater degree of irritation than previously existed, and in all probability to a complete retention of urine. It usually, however, calms the existing irritation, and, after a few hours, if the patient becomes sensible of any difference, it is that his water passes more freely than before. The dilatation, nay, the mere separation of the sides of the urethra without any especial dilatation, has an influence of a very favourable kind on a stricture, and may, without being carried further, effect a diminution of the contraction in slight cases, so as to allow a bougie to pass with little difficulty. In severe cases, the dilatation of the canal in front of a stricture does but little unless the dilating substance touches the stricture itself; a fact I have had proved, by finding that a bougie may remain for months in a false passage, beginning immediately in front of a stricture, without exerting upon it any perceptible influence.

The best dilating material is a pliable hollow gum elastic bougie, of a medium size, perfectly smooth, and tolerably round at the point, so that it may give as little uneasiness as possible. This instrument is to be fixed in the urethra in the same way as a gum elastic catheter is fixed in the bladder; it should project about one inch beyond the orifice of the urethra, and rather less than more. The point should press against or rest upon the stricture with the greatest possible gentleness, so that it may not give rise to inflammation or ulceration, and yet should press just so much as to cause absorption. It is an admitted point in the animal economy, that new-formed parts, whether laid down in reparation or in disease, do not resist a stimulus in the same manner as parts of original formation. They are in fact removed by the action of the absorbents under the application of a stimulus, which has little or no influence on parts which have undergone no change, and are coeval with the existence of the individual. The pressure made by the point of the bougie should therefore be nicely regulated, so that it may do this and no more. The patient readily learns what is wanted, and as he can feel when the surgeon cannot, he soon understands how to manage the bougie himself, and can take it out, wash it, change it, or replace it, as he pleases. If he should be a very restless, fretful, or naturally irritable man, it may prevent sleep or prove inconvenient, in either of which cases it may be removed for two or three hours, at the pleasure of the individual, whose private affairs may otherwise render this indulgence necessary. If any further irritation should take place, it ought to be subdued by warm fomentations, by opiates, and perhaps by the application of a few leeches. There are few cases which require anything more, provided the patient will be perfectly quiet, live moderately, and preserve the recumbent position, until the irritation has subsided.

The principal and most satisfactory sign of amendment is the more ready flow of the urine; and although the bougie should not appear to advance, the improvement on this point is often progressive, until at last the bougie is either found to have passed through the stricture unknown to the patient, or is gently pressed through by his own hand, or by that of the surgeon. This object is effected in some cases in from three to six days; in others the progress is slow, although evident, and may require weeks; and in some in which the obstruction is very hard and gristly, this method fails altogether, rendering the part more painful, by giving rise to inflammation in it, and to irritation in the bladder, requiring the removal of the instrument, and the abandonment of the practice. When it succeeds, and the canal is rendered pervious, the cure is only half completed, although the most difficult and dangerous part has been accomplished; the stricture has yielded in its centre, but not in its circumference. When the bougie has passed through the stricture, and the bladder is not in an irritable state, a catheter should be passed into it, as it is always a great satisfaction both to the patient and surgeon to see the urine flow through it. In the case of a gentleman whose stricture had been overcome in this way, the point of a small bougie almost always entered into one of the openings of the ejaculatory ducts, and that of a larger one caught on it, and would not often proceed without a little management. If the error had been committed of allowing the bougie to lodge in one of these openings, inflammation would in all probability have been communicated to the testis; and there is always some chance of such an accident occurring when the orifices of these ducts are irritated even by the instrument resting upon them.

The following cases have been selected as illustrative of many of these points, and as being those of medical men, and written by themselves.

June 20th, 1831. A. S——, M.D., aged 38, has had stricture in the urethra for eighteen years past; but no instrument has ever yet been passed into the bladder, with the exception of one very fine catgut bougie, which could never be introduced again.

In 1824, he was affected with severe rigors and fever, recurring twice a-week; and about this time retention of urine for forty-eight hours occurred. The caustic bougie was repeatedly used, but was discontinued on account of the rigors that occurred after each application. In 1825, the dilating plan was followed for some months, with an evident improvement in the general health, and an increased stream of urine. On the 14th of August 1830, was seized with great pain and irritation about the neck of the bladder, and great difficulty in passing water, which came in very small quantity at a time with great straining. These symptoms did not yield to the repeated application of leeches, the hip-bath, anodyne enemata, and suppositories of opium and extract of belladonna; but continued to increase and become more alarming until the 22d, when urinary coma came on, and it was deemed necessary to puncture the bladder above the pubes, when a very large quantity of thick, stinking, mucous urine drawn off: in about three hours afterwards the coma subsided, and things seemed going on well for a couple of days, when an abscess formed in the perineum, into which an incision was made, and a quantity of extremely stinking matter discharged. Two others formed in the scrotum and groin in succession, and the recovery after this was very slow. The urine began to come away a few drops at a time by the natural passage; the catheter which was introduced through the puncture into the bladder, was changed about once a-week. It was now attempted to dilate the urethra by the occasional introduction of bougies, and afterwards of graduated sounds, which has been continued up to the present time, but without being able to get any instrument through the stricture into the bladder.

June 22d, 1831. Mr. Guthrie introduced a pliable hollow gum elastic bougie down to the stricture, and, having fastened it by a belt round the penis below the glans, left it there with its point pressing on the stricture, and about an inch projecting beyond the extremity of the penis. The passing of the instrument occasioned some pain, and in the evening there was heat and uneasiness along the course of the urethra, which was relieved by taking a draught with twenty-five drops of the Lancaster black drop.

23rd. Passed a quiet night; slept well towards morning; the instrument has kept well in its place; some uneasiness and irritation in the urethra; pulse a little hurried; having kept very quiet in bed all day the uneasiness and irritation were nearly gone in the evening, when the instrument was withdrawn, washed, and replaced; repeated the anodyne draughts; and took a pill of extract of colocynth, five grains.

24th. Slept well; catheter kept well in its place, and caused very little uneasiness; kept quiet in bed all day; removed, washed, and re-introduced the catheter; draughts and pill repeated at bedtime.

28th. Had an uneasy night; pain and heat along the urethra, and irritation at the neck of the bladder, which were relieved by removing *the cork from the puncture-catheter above the pubes, and* *allowing the urine to trickle away in drops for the space of four hours;* repeated the pill and anodyne draughts, with forty drops of the Lancaster black drop.

July 1st. The instrument is advancing, and not causing any uneasiness; draught and pill repeated; puncture-catheter changed.

6th. Instrument in as far as it can go; changed for a longer; it appears, on measurement, that it has penetrated an inch since its first introduction.

7th, 8th, 9th, and 10th. Going on well; no uneasiness.

11th. A good deal of irritation at the neck of the bladder in the night, so that the instrument had to be withdrawn; after which some urine came by the urethra two or three times with considerable straining, and then close on half a pint in a better stream than had been made for many years, and with much less exertion.

12th, 13th, 14th, and 15th. Stream of urine by the natural passage continues to improve.

16th. A small-sized gum elastic catheter passed with tolerable ease into the bladder, and was left in.

17th. Some uneasiness about the neck of the bladder; urine runs both through and along the side of the catheter.

19th. No. 2 catheter withdrawn, and No. 4 introduced with little difficulty into the bladder.

21st. No. 4 withdrawn, and No. 6 introduced with little difficulty in its stead.

23rd. No. 6 withdrawn, No. 8 introduced with little difficulty, but occasioned a sensation of great distention along the course of the urethra.

24th. In the afternoon, considerable pain and throbbing in the perineum; withdrew the catheter until bed-time, and then put in the short instrument used previous to the introduction of No. 2; urine passed in a large stream when the catheter was out.

25th. Withdrew the short instrument, and introduced No. 8 with great facility; some pain in the perineum in the afternoon.

26th. Pain in perineum, which increased with a good deal of swelling towards the evening, when the catheter was withdrawn. Eight leeches, and afterwards a poultice, applied to the part. An anodyne draught and pill at bed-time.

28th. Tumour broke, and discharged some matter; poultice continued.

29th. Discharge continues; poultice repeated. Introduced No. 6 catheter, and kept it in six hours.

30th. Discharge much diminished. Catheter would not pass into the bladder. Great needing, which was relieved by keeping the cork out of the puncture-catheter for two hours.

31st. Catheter could not be introduced. Introduced the short instrument at bed-time. An anodyne enema taken during the night.

Aug. 1st. Catheter No. 6 passed easily into the bladder.

2d. No. 6 still in; some irritation at the neck of the bladder. Injected an anodyne enema, and kept the puncture-catheter cork out for two hours.

4th. Catheter No. 7 introduced. At night great uneasiness about the neck of the bladder occurring at short intervals; took an anodyne enema, which not removing the uneasiness, the catheter was withdrawn, and the short one introduced an hour afterwards, and worn in all night.

6th. No uneasiness; withdrew the catheter, and passed water in a large stream three or four times. Introduced the short instrument at bed-time.

7th. No. 8 introduced with ease; a good deal of irritation at night, which was relieved by an anodyne enema, and keeping the cork out of the puncture-catheter for about an hour.

8th. Had a good night after the enema; quite easy all day.

10th. No. 9 metallic catheter passed easily, but occasioned so much pain about the neck of the bladder that it was withdrawn in two or three minutes.

11th. No. 8 gum catheter introduced.

12th. A No. 10 metallic catheter shortened was introduced with ease, which occasioned a good deal of irritation and needing at night; relieved by an anodyne enema.

14th. Removed the No. 10, and introduced an elastic gum of the same size. A little uneasiness and needing at night; relieved by an anodyne enema.

15th. Withdrew the catheter in the evening and walked out for an hour; greatly fatigued after the walk; a sensation of rawness along the urethra. No. 10 gum catheter introduced at bed-time.

16th. No. 10 removed and No. 11 metallic catheter introduced without difficulty; after being in some time there was uneasiness near the neck of the bladder, which was relieved by an anodyne enema.

17th. Slept well; quite easy to-day; withdrew No. 11 in the evening and walked out for an hour. Great rawness along the urethra after making water, which continued all the evening.

18th. Kept out the catheter all day; urethra feels very raw.

19th. No. 10 elastic catheter introduced, as the metallic No. 11 would not pass.

21st. No. 12 metallic catheter was passed without difficulty into the bladder, but produced so much uneasiness that it was withdrawn in the course of two hours and a half, and a gum elastic one of the same size introduced in its place.

22d. Some pain in the perineum; withdrew the catheter, and applied seven leeches; an anodyne enema at night.

23d. Slept well; pain quite gone; No. 12 flexible catheter introduced into the bladder.

25th. No. 12 still in; a good deal of irritation about the bladder; an anodyne enema at bed-time.

26th. Withdrew the catheter, and walked out during the day; introduced it again in the evening, and kept it in fourteen hours.

27th. Catheter in for twelve hours to-day.

29th. In for eight hours; withdrew the catheter from the puncture above the pubes entirely, it having been gradually diminished in size for the last four or five changes.

31st. Only a few drops of urine passed through the puncture to-day; comes by the urethra in a very large stream.

Sept. 1st. Catheter No. 12 passes with great ease; puncture entirely healed.

2d. Catheter No. 12 in for two hours, urine comes away in a full stream, and the health is better than it has been for the last ten years.

This gentleman remains quite well, passes his urine in a free, full stream, and introduces a No. 11 silver bougie once a-week.

For eleven months he scarcely passed a drop of water through the urethra, but wore a gum elastic catheter in the wound above the pubes, which he fastened with sticking-plaster against the abdomen above the umbilicus; and through this he made water when he felt a desire, and which he experienced in the natural and usual way. The facts of most importance in this case are the sympathetic irritation which took place on the neck of the bladder when the stricture began to be absorbed, which was relieved by allowing the urine to dribble off, and the advantages derived from the use of the short bougie, which went through the stricture, but did not reach the irritable neck of the bladder.

"I have had strictures about ten years, but suffered little inconvenience from them until within the last five years, during which time the pain and frequency of passing my urine has gradually increased, so much so that I could get but little rest of a night, being often obliged to get out of bed eight or ten times to make water; attended with a great discharge of matter from the urethra, and the urine depositing a thick mucous sediment immediately it was passed. The attacks of ague which I have had at irregular intervals for the last five years, increased in frequency and violence as the strictures got worse, sometimes having them once or twice a week for the last two years, and an attack always followed the introduction of a bougie. All the remedies tried for the ague had no effect in preventing it, until I placed myself under the care of Mr. Guthrie, in March. On the 31st of March, Mr. Guthrie divided, at my desire, the first stricture, which produced but little irritation, and the ague which came on about two o'clock the following morning was very slight and lasted only two hours, whereas before the operation, I did not recover an attack under twenty-four hours, and I have not had the slightest return of it since. April 4th. Passed a hollow elastic gum bougie down to the second stricture, and kept it in about eight hours a day. On the 12th, got it through the second down to the third without much irritation; the urine passed much better and in a larger stream, and I seldom had occasion to make water during the night. On the 21st, the pressure of the bougie on the third stricture was very painful for about an hour, when it became suddenly easy, and I removed the bougie, which was followed by a great discharge of matter, and the urine flowed in a full stream without pain; passed a bougie at night into the bladder with little difficulty, and have worn one six or eight hours a day, gradually increasing the size to

No. 8, which on the 16th of May, gave me no pain in passing it into the bladder. I keep it in about four hours a day, and can pass my urine in a full stream without the slightest pain or inconvenience, and consider the strictures perfectly cured. I am now (24th May 1834) in much better health than I ever remember to have been. "H. H."

This case shows a combination of means. The division of the first stricture, which was always passable to a No. 4 bougie, and was a mere thread, although a very irritable one, removed the ague. The second stricture was the impassable one, and the source of his great urinary distress, and the cure scarcely occupied more than six weeks.

The second mode of treatment by occasional pressure should always be chosen when the obstruction is not of long continuance; a solid sound should be selected, of the shape indicated by figure 3, page 37, and passed down to the face of the stricture, against which it ought to be gently pressed, and insinuated into the passage if possible, until the point of the instrument shall appear to be firmly held by it. The size of the solid sound or bougie should never be less than No. 2, and ought rarely for this purpose to exceed No. 4. If too small, it will be apt to pierce the urethra, and make a false passage; and if too large, it will not succeed under a great length of time, if it should not fail altogether. The only difficulty which occurs in the management of these cases is, when the obstruction is at or near the termination of the bulbous portion of the urethra; and the evils to be avoided are those of making a false passage, or of exciting too much irritation in the part, so as to give rise to inflammation, the formation of matter, and perhaps a retention of urine. To avoid these misfortunes, the solid bougie should be used with the greatest gentleness, the pressure ought to be very light, and well regulated for a few minutes only; or if the point of the instrument enters and sticks in the stricture, it should not be continued beyond an hour, and not even for this time, if it should give rise to irritation, pain, or hemorrhage. It ought not to be repeated oftener than every two or three days, and an interval of several days in the treatment is often advantageous when the parts become irritable, although progress is evidently making by the bougie, as denoted by the increase of size in the stream of water. The use of the model bougie is essentially necessary from time to time, in order to show the state of the face of the stricture; and as long as the end of this instrument returns blunted, and round or shapeless, or of the form originally taken by the model, as in figures 1, 2 or 3, page 73, the solid bougie is acting properly; but when the end of the model bougie assumes any thing of the forms shown in figures 4, 5 or 6, the commencement of a false passage has been begun, which in fact may be suspected, if blood should flow beyond a few drops after each application.

In order to prevent an accident of this kind from taking place, the point of the solid bougie—and this is the great advantage to be derived from its use—should be borne against the upper surface of the urethra, under the pubes; and in this way upon the upper part of the obstruction, which should be pressed upon steadily and firmly, but always with gentleness; and when the point of the solid instrument is supposed to have entered the stricture, the handle of the instrument should be carefully and lightly, but not forcibly depressed, when the point still borne against the upper part may slip through, or rather appear to ride over the ridge, which the stricture opposes to its progress, and enter the bladder. When the instrument has passed under the arch of the pubes, and is in the stricture, it will remain in its place without being held by the surgeon, or with the least possible assistance from the patient to keep it steady; but when it has not gone so far, it will always turn round and fall out, unless it is held in its place; and as a permanent and serious obstruction is almost always under the pubes, this turning of the instrument is a good proof that its point is not in the stricture, and a fair warning, if the bougie has made progress, that it is in all probability somewhere else forming a false passage.

The formation of a false passage has been always considered as one of the greatest evils which could happen to an individual suffering from an impassable stricture, nevertheless it is by no means so formidable an accident as has been supposed, and under proper management is rarely of any serious consequence. A false passage may be formed in the upper part of the urethra, as a possible, although an exceedingly rare occurrence; it may occur by the side in a greater number of instances; but it almost always takes place in the under part, the instrument passing downwards into the perineum, and going backwards between the membranous and prostatic parts of the urethra and the rectum, and even between it and the bladder.

The commencement of passages of this kind is usually accompanied by some bleeding, but it is not always so. I have known gentlemen make false passages for themselves without being aware of it, and after the wall of the urethra has been pierced, the instrument will often penetrate the cellular membrane for inches without the patient being sensible of it. It might be supposed that the urine would pass into the false passage and excite irritation; it very rarely, however, does this; and it may be said that the principal, if not the only inconvenience, arises from the difficulty which is experienced in preventing the bougie from going into it, instead of going into the stricture. The opening of a false passage will frequently close, if the part is let alone; and whenever one is made, the use of the bougie should be given up for a time, and the hole allowed to heal, before further attempts are made to overcome the stricture; unless the surgeon is a very experienced person, and thoroughly conversant with the relative situation of all the parts concerned.

The face of a stricture is the toughest part of it, and a solid instrument readily slips down against its lower edge, and penetrates the urethra at that part, even in the very best surgical hands that London can produce. A young surgeon must always then stand in fear of this accident, and guard as much as possible against it, but he cannot always prevent it, and few cases of great difficulty present themselves to the more experienced practitioner in which at one time or another a false passage has not been made. There is no direction so simple as that which enjoins that no violence is to be used, that nothing is to be done but by gentle means, and yet in very serious cases nothing can be done but by something which more or less departs from that rule. It is a certain degree of force regulated by art, and is the highest point of skill and ability a surgeon can attain in the management of these complaints. Sir B. Brodie says, "In using the sound, you should pass it carefully as far as the stricture, and then press the point firmly and steadily against it, taking care that it is directed in the line of the urethra towards the bladder. The pressure is to be continued for five, ten, or fifteen minutes, or even longer. The pressure should be such as can be made without the urethra being lacerated, and without inducing any considerable degree of pain." These directions are excellent, but they are difficult of accomplishment, from the different estimates made by different surgeons of what is, and what is not violence or gentleness.

When these different ways of removing a stricture have failed, when the bladder is becoming more irritable, and the health of the patient is so seriously implicated, that relief must be obtained at all hazard, one of the operations recommended for this purpose ought to be performed; and there are differences of opinion as to which is the best, which I shall endeavour to remove, or at least to estimate as accurately as possible. The operation I have recommended is to be done in the following manner: The patient being placed as in the operation for the stone, a catheter or sound is to be passed down to the stricture, and held steadily against it. The rectum having been previously cleared by an enema, the forefinger of the left hand being duly oiled, is to be introduced into it, and the state of the membranous part of the urethra and the prostate are to be carefully ascertained. The principal object in introducing the forefinger is to ascertain the relative situation of the upper part of the rectum and the urethra, which latter part only approaches to, or is almost in direct application to the rectum, near the termination of its membranous part and the commencement of its prostatic portion. There is a certain distance, which is greater or less in different individuals, between the last inch of the rectum and the urethra placed above it. The two parts form two sides of a triangle, the apex of which is the prostate, the base the external skin; and it is within the two lines of the triangle that the operation is to be done. The surgeon taking the catheter in his right hand, whilst the forefinger is applied to the upper surface of the rectum, moves the point upwards and downwards, so as to convey to the forefinger of the left hand a knowledge of the situation of the extremity of the instrument, and particularly of the distance between them; and which the motions given to the catheter by the right hand will clearly indicate. The thickness of the parts between the obstruction and the rectum can be estimated with sufficient accuracy, both at the point where the left forefinger is applied, and at the surface of the skin; for, although the membranous part of the urethra cannot be easily felt from an incision made on the left side of the perineum, it can be distinguished from the rectum. The next step of the operation is to divide the skin, cellular membrane, fascia, muscular and tendinous fibres, which may intervene between the upper surface of the rectum and the under surface of the anterior and middle portions of the membranous part of the urethra. This is to be done by a straight, blunt-backed, narrow, sharp-pointed bistoury fixed in its handle; the point of which is to be placed on the skin, a little above the verge of the anus, the cutting edge being upwards, the blunt back towards the rectum, the handle being a little depressed, the point somewhat inclined upwards. The degree of inclination necessary to carry the knife inwards for the distance of an inch, and clear of the rectum, will be indicated by the finger in that part; and the eye of the operator should correspond with the point of the forefinger, so that the bistoury may be steadily pressed in to that extent, and then carried upwards, and brought out in the exact median line, making an external incision of at least an inch and a quarter to an inch and a half, as regards the external parts. If the perineum is much hardened, and consequently unyielding, a transverse, curved, or crescentic incision should be made across it, the centre of which should correspond with the raphe, and be one quarter of an inch above the verge of the anus, or as near that distance as may be, with due regard to the safety of the rectum. This gives room, and allows the parts to be separated as much as they will admit. The wound having been sponged and examined, the surgeon should again introduce the bistoury in the median line, the point being directed upwards and backwards towards the urethra, and he may then deepen the cut without fear, for the forefinger in the rectum will always inform him where the back and the point of the bistoury are. The opening will now be sufficiently large to allow the operator to lay aside the knife, and to feel for the urethra with the point of the forefinger of the left hand, keeping the end of the catheter steady against the stricture, which will be readily felt, and through which the catheter will now often pass with a little pressure. If it should not do so, and the point of the forefinger does not go beyond the stricture and touch the sound part of the urethra, which may or may not be dilated by the urine, the knife is to be resumed, and the forefinger being placed in the wound, on the outside of the rectum, which is to be depressed as much as possible, the back of the knife is then to be turned to it, and whilst the patient strains, the point should expose and open the urethra, which it can do very easily, as far back, if required, as the apex or transverse portion of the prostate, or at the termination of the membranous part of the urethra. It will not be necessary however to go so far back, and the membranous portion may be opened at its middle part with every advantage, and with perfect safety to the intestine. A tolerably good anatomist and surgeon will open the urethra in this way sooner than the mode of doing it can be described, the urine will make its escape, and the patient will be at once relieved. The stricture should now be divided, and the catheter carried on into the bladder.

In order thoroughly to understand the method of doing this operation, the surgeon should dissect the perineum, first, in the usual manner, and make himself well acquainted with the central tendinous point, as it is called, to which the transversi perinei, the acceleratores urinæ, the sphincter ani, and the compressor urethræ muscles, are attached. This being divided, and the acceleratores muscles being separated in their median line, they ought to be turned aside, when their deeper structure surrounding the urethra can be examined, as well as the bulb of the urethra which they cover. The sphincter ani muscle, both in its superficial and deep part, should now be carefully investigated, in connexion with the bulb of the urethra and the attachments of this part to the deep perineal fascia. A side view of the pelvis should then be obtained, and the relative situation of each part duly estimated, and which a dissection from within the pelvis outwards will confirm and establish in the mind. The most important dissection is to be made, after the body has been turned on the face and the pelvis raised, so that the parts are elevated and made more tense. The sacrum is to be exposed with the edges of the glutæi muscles, the coccyx is to be cleaned, and the sphincter and levator ani muscles are to be fully exposed from behind. The manner in which the levatores ani cross from side to side to make the funnel-like process usually described is then well seen, but they make principally the body of the funnel, leaving a tube extending from it for an inch and a half and sometimes two inches, but entirely cut off by it from the cavity of the pelvis; and a student can have no idea of the possibility of removing an inch of the extremity of the rectum, or of the safety with which he may divide an inch and a half of it, unless he has made this dissection. The gut is covered by these fibres, which form the tube of the funnel, and intermingle with those of the sphincter; and the inside of the levator is lined by a fascia, which is reflected upwards on the side of the rectum, prostate, bladder, etc., and separates these parts from all beyond or below them. The sacrum should be now removed, and the levatores ani carefully divided in a median line on the rectum. The sphincter ani should be treated in a similar manner, and the whole of the lower part of the rectum exposed. This gut should now be turned backwards, the recto-vesical fascia being divided in a similar manner; this being done, there are still muscular fibres, fasciæ, and cellular membrane to be dissected and divided, before the membranous part of the urethra, the prostate, the vesiculæ seminales, and the back of the triangular space of the bladder, are brought into view. This is one of the most important and valuable dissections a surgeon can make in the human body. The perineum should also be carefully dissected, and the connexion of the superficial with the deep-seated fascia should be demonstrated.

This operation has been performed by many of my old pupils and friends, both at home and abroad, with the greatest success. It is usually done in three or four minutes, and never has yet failed in the hands of any one with whom I am acquainted.* If the surgeon should from timidity, or from supposing he will have less to do, prefer cutting on the face of the stricture, with the view of dividing it first, he will be frequently disappointed. If the stricture is at the posterior part of the bulb he must divide that part to get at it, which is of no sort of consequence, and leading to no inconvenient result, although the contrary has been asserted. On opening the urethra, he will find that he is probably half an inch from the stricture, having cut on the point of the catheter when turned downwards; this half inch must be divided, and when the stricture is exposed, a small lachrymal probe or a small director may be perhaps passed into the canal, and made to reach the membranous part of the urethra; the sharp-pointed bistoury may then be run along the director, and be made to cut transversely on each side, and then downwards, if necessary, until a straight or female catheter can be passed easily into the bladder. If the surgeon should have begun his operation in this way, and cannot get a director into the stricture, he should introduce the forefinger of the left hand into the rectum; and having ascertained the relative situation of the line of the rectum and of the urethra, and the incision he has made, he will obviate the difficulty by steadily pressing on the straight blunt-backed bistoury through the stricture, the edge being turned either upwards or sideways, until his director can be passed, and the urine begins to flow, care being taken to preserve as much as possible the course or line of the canal.

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* Mr. Bedford, of Hobart Town, in Van Diemen's Land, informs me he has practised it with complete success in that country.

The stricture should be divided in either mode of proceeding, for a patient, in submitting to an operation, expects that the obstruction from which he has suffered so much should be removed; and unless it can be proved that some particular advantage will result to him from not doing it, or not having done it, he will not be satisfied with his treatment nor with his surgeon, if he has to undergo another operation.

When there is but little irritation in the bladder, a catheter may be carried on into it, and allowed to remain for the purpose of obviating the irritation which the urine will cause on the newly divided parts, and to secure its free evacuation; for in some cases, where the operation has been long delayed, and the urethra has been about to give way by ulceration behind the stricture, it will do so afterwards, when some urine may escape into the surrounding parts, and more particularly if the external opening should be a small one. Where the mucous membrane of the bladder is very irritable, the catheter, if introduced, should be withdrawn as soon as it is found to give rise to an increase, or even to a continuance of irritation. None but those who suffer can know the relief which is obtained by withdrawing a catheter one inch from an irritable bladder, and no precise direction can be given on this point; the treatment must depend on the feelings and sensibility of the patient. I have seen a man with an irritable bladder draw out the catheter and throw it away in despair, although he knew he should not be able to pass his water an hour afterwards. The present agony overcame all feeling for the future, until that future in turn became the present. The relief obtained by allowing the instrument to remain in the urethra instead of the bladder is often great, and it can be advanced at any time if necessary. The mechanism required to retain a catheter or bougie at a given distance is simple. The elastic catheter should rarely exceed eight inches in length, and should never project half an inch more than is necessary. It ought to have a silver extremity to which two rings are affixed, and to each of which a piece of strong bobbin, ten inches long, is to be attached. The catheter being introduced to the proper distance, the two pieces of bobbin or strong thread are to be carried backward along the sides of the penis as far as the pubes, and a narrow slip of sticking-plaster is then to be bound round the middle of the penis and over them, so as to fix them firmly to it, and which the sticking-plaster does as well as any thing else. The ends of the bobbin or thread are then to be turned forwards on the outside of the plaster, when they may be tied together on the end of the catheter, which is thus steadily fixed in its place, subject, however, to any motion of the part generally, with which it moves as a whole; and the patient soon learns to manage the apparatus for himself, so as to change it whenever he pleases without inconvenience; or an elastic band may be sewed or buckled around the penis, with hooks attached to it, through which the threads may run.

Sir B. Brodie has recommended a modification of the operation formerly practised of opening the perineum on the left side, by uniting with it the perforation of the stricture, by a cutting-instrument resembling Mr. Stafford's. I had the pleasure of assisting him in one operation of this kind, in which a portion of the urethra had become hard and cartilaginous, which answered remarkably well, and to which he has alluded in his work. He laid bare the strictured part, opened the urethra behind it, and then perforated the stricture. I consider my operative process, however, to be simpler and more certain, by making the first incisions in the line of the centre of the perineum. After the strictured part has been fairly exposed, it is almost a matter of indifference whether it be divided or perforated, perhaps the latter method is the best; the great point, however, is to avoid much of an operation in the perineum.

It is but just to my excellent colleague Mr. White, to say that I assisted him also at a very laborious and difficult operation of this nature more than twenty years ago at the Westminster Hospital, in which, after laying open the perineum and the urethra, and exposing the gristly substance, which occupied for near an inch the place of the urethra, he passed a Ponteau's trocar and canula, which he had had straightened for the purpose, down the urethra and through this mass, until it appeared in the wound below. A metallic catheter was afterwards passed into the bladder, and the wound healed over it, thus forming a new urethra. The patient was, however, obliged to pass an instrument from time to time to prevent the recurrence of his disease.

The late Dr. O'Halloran, of the 60th regiment, suffered many years from stricture, which from neglect contracted so much, whilst in the West Indies, as to make his life miserable. Being a man of great resolution he determined on dividing the stricture himself, which he did before the glass, opening the perineum just behind the scrotum. He assured me some years afterwards that the cure was complete, and that he had never since had occasion to pass an instrument. I have been as successful in effecting a cure in similar instances; although I am not able to account in a satisfactory manner for its not always being as complete, nor in what way such a consummation is to be certainly obtained.

When the stricture is impassable, and the perineum is tolerably sound, with the exception of a false passage, and few bad cases are without them, I have succeeded in many instances by gentle but steady pressure applied in the manner directed pages 105 and 106, in passing a catheter into the bladder.

W. J. had long suffered from stricture at the bend of the urethra, the consequence of an accident, which had become impassable, hard and cartilaginous. The model bougie showed the commencement of a false passage, which it was sometimes difficult to avoid;

no soft or elastic bougie would enter the stricture, and although a small solid one would enter and stick into it, a further advance of it could only be obtained by steady pressure, which was resorted to in consultation with Mr. Keate, and a small catheter was carried into the bladder with some difficulty. The irregularities which remained in the canal required some little time for their removal. This gentleman has returned to his official duties abroad, passing occasionally a No. 11 solid instrument, which he does, he writes to me, without difficulty.

A respectable man applied to me with his surgeon, whilst correcting the press for this work, on account of an impassable stricture of six years standing, which rendered micturition very difficult, and a false passage, into which and the urethra a bougie could be introduced for twelve inches, although it did not go into the bladder. I found on examination that a No. 3 catheter would just enter the stricture, although it would not go fairly into it and stick there, with any degree of pressure I thought it right to use. This first essay gave rise to some irritation, and when it had subsided, I decided on passing the same catheter into the bladder. The great difficulty in doing this, arose from the false passage which had been made immediately below the stricture, and in which the silver catheter could be felt between the rectum and the urethra and bladder exactly in the median line, so that the point of the instrument went up almost to the vesiculæ seminales, without giving rise to any inconvenience. This difficulty being overcome, and the point of the instrument being kept in its proper situation, it was steadily although slowly pressed on into the bladder without any division of the surface of the stricture. The silver catheter being a long one, gave rise to so much irritation in the bladder, as well as being stopped up, that it became necessary to withdraw it on the third day, and I had some difficulty in introducing a No. 4 elastic one the next morning. He can now pass an instrument of a size equal to the orifice of the urethra, and will do so occasionally to prevent a return of his complaint.

The idea of having an operation done by the knife in the perineum, simplified as it now is, alarms so many people, and to such a degree, that they will not consent to its being done until the last moment; and some even will not submit to it under any circumstances, although almost all assent readily to any attempts that may be proposed to render the natural canal pervious. If the attempt to carry the catheter through the stricture by gentle pressure steadily applied, as in the two previous instances, should fail; the face or anterior portion, which is the hardest part of it, should be divided, when the point of a catheter, smaller than the instrument by which this was effected, will more readily enter, and can be safely pressed on into the bladder, every thing being ready to enable the surgeon to open the urethra through the perineum, if he should fail in effecting his object. I have not had occasion to do this operation of late, and do not think I shall be obliged to resort to it; being under the belief that I have obtained so far the mastery of these obstructions as to be able to overcome them, in most instances, without having recourse to an incision in the perineum.

The following case in which I tried it was unfortunate, although the mode of proceeding was successful. The patient, a medical friend of mine, had laboured under an impassable stricture for many years, and came to London, some years ago, suffering under a considerable degree of mental anxiety, if not of derangement. When I saw him the retention of urine was complete, his general state of health was exceedingly bad, and it was obvious that immediate relief, with respect to his urinary organs, was necessary, to afford even a hope of saving his life. I accordingly passed a No. 6 cutting instrument down to the stricture, and divided the face of it; but as the instrument itself would not follow into and through the opening thus made, I selected a No. 4 silver catheter, the smaller point of which entered the opening without difficulty, and was readily carried through the obstruction into the bladder, where it was fixed in the usual manner. A small quantity of urine was desired to be evacuated every two hours, or as he felt any wish to be relieved. In the night he untied the string which fastened the catheter in the bladder, not being quite sensible at the time, and drew it out, which was not observed until morning; when, on inquiring whether he did not wish his water to be evacuated, it was found that he had frequently endeavoured to make it during the night, and had forced it into the scrotum, penis, and perineum. I did not hear of the accident until the afternoon, when I called to see him, and it was then too late to afford him any effective assistance.

The urine, in this case, was forced through a hole in the urethra, caused by the ulceration which had begun, in all probability, behind the stricture, before the operation was performed, and which would have been of no consequence if the catheter had been properly attended to. The advantage gained by using a catheter smaller than the cutting instrument in this case was obvious, for great difficulty is often experienced in forcing the cutting instrument through a hard and gristly obstruction, even when the point has penetrated beyond it. There can be no doubt, however, that if the urethra had been opened from the perineum, the mischief which ensued from the untimely removal of the catheter would not have taken place, and the life of the patient might have been preserved.

A poor man was admitted into the Westminster Hospital about the same time, with retention of urine, caused by an impassable stricture, at so advanced a stage as to render some immediate relief necessary. I therefore opened the urethra in the median line, by the operation I have described, page 107, which was done in less than three minutes. The stricture was divided, and the urine was allowed to pass through the opening, from time to time, as the irritable state of the bladder rendered it necessary, the presence of a small elastic catheter in it causing much inconvenience. The next day some swelling took place on the right side of the scrotum, at its upper part, indicating that a small quantity of water had escaped through the urethra, into the sac formed by the superficial fascia. An abscess formed which required to be opened, but it did not delay the cure of the patient, who rapidly got well, and the urethra healed around an elastic catheter, sometimes kept in for a few hours, sometimes only passed occasionally.

In this case, the same thing occurred to a small extent; but the opening in the perineum prevented further mischief. In another instance, in which I operated in a similar manner, as an extravasation was about to take place, I took care that the transverse incision was sufficiently free, and that an opening was made at its external angle into the superficial fascia of the perineum, so as to prevent any accumulation of urine, if any should have escaped by the side of the catheter. In a third case, no accident of this kind occurred, but the catheter kept up so much irritation in the bladder that it was obliged to be withdrawn at an early period. It should be borne in mind, however, that this irritability of bladder only occurs in old persons and in neglected cases, or in those persons in whom the operation has been too long delayed.

An officer of hussars presented himself to me, with a narrow stricture at the orifice of a large urethra, which would scarcely admit a No. 3 bougie, accompanied by a considerable discharge, and much irritation, and desire to make water. I divided the contracted part of the orifice, with the small spring bistoury, and he can now use a No. 16 with ease.

A soldier had laboured under permanent stricture for many years, at the curve of the urethra, with a false passage, which rendered him so unequal to the performance of his duties as mess-man, that his commanding-officer sent him to me at the Westminster Hospital. I divided the face of the principal stricture, carried a small silver catheter through the remaining part of the obstruction into the bladder, and soon sent him back to his regiment quite well, where he now is in perfect health.

The success attendant on this case induced an officer who knew the man, to send me up, this winter, to the Hospital, another soldier from the depôt of his regiment, who was even in a worse state, and who was about to be discharged, although a very valuable servant. He had several bad strictures in the anterior part of the urethra, as well as one at the termination of its bulbous part. Treated in a similar manner, he has returned cured to his depôt, with directions to pass a No. 11 once a-week.

An officer of the navy applied to me, having been found unfit for duty on a very distant service from frequent retention of urine; the consequence of an impassable stricture near the bend of the urethra. He had been under the care of thirteen surgeons at different periods for six years, who had never been able to pass an instrument into the bladder. An ordinary examination caused a severe rigor, requiring rest for several days; when he recovered from this, a slight touch of the cutting instrument on the face of the stricture admitted the introduction of the point of a small solid bougie, which was then passed into the bladder, and was followed by a very severe paroxysm of fever, resembling in every respect a fit of the ague, and whenever a little irritation was excited in the urethra it returned. On passing a No. 9, which was kept in for an hour or more by accident some little time afterwards, he felt the rigor begin the moment the urine touched the sensible part. He can now pass an instrument which fills the orifice of the urethra, and will continue to do so weekly or monthly for some time, until he feels that his cure is perfected.

Captain T. first discovered he had strictures in the urethra in 1828, from whence he continued up to 1839, living freely and subject to frequent attacks of retention of urine, which he was usually able to relieve by passing a bougie down to the irritable part, and allowing it to remain for a few minutes, when the water followed its withdrawal. In the beginning of 1840, his urine passed only by drops, and he applied for the first time to a surgeon, who could not pass an instrument beyond six inches, although attempts were daily made to do it until August, when a small gum elastic catheter went into the bladder, and the size was gradually increased to No. 12 by the end of six weeks. From this time he passed a bougie occasionally, and lived very irregularly; the difficulty in passing each instrument gradually increasing until it would not go beyond six inches. After several trials in October, he found it suddenly proceed for an inch, and to the right side, and a few days afterwards it went three inches further, but no urine followed; he therefore gradually increased the size of the catheter to No. 12, taking it out each time he wished to make water. In December he gave up wearing the instrument, as he felt the point of it sticking out behind the anus towards the back, and only passed one occasionally, between which period and June 1842, he suffered several times from retention of urine, and was obliged to confine himself to his room. On the first of November he placed himself under my care; and the anterior part of the passage having been cleared of several strictures by the 2d of January 1843, I slightly divided the face of the hardest and most gristly one at six inches, and carried a silver catheter through the obstruction without any particular sensation or pain into the bladder. On the 27th of February he could himself pass No. 12; but his health having also suffered from an affection of his lungs, and his affairs being pressing, he went into the country, and contents himself with passing a No. 8, until he can return to town.

A poor man, sixty-six years of age, was admitted into the Westminster Hospital with an impassable stricture six inches down the urethra, a fistulous opening in the perineum, and a hard swelling in that part as large as half a small apple. The face of the stricture being divided, a No. 4 silver catheter was passed into the bladder without much difficulty; but as it was firmly grasped by the hardened stricture, it was thought best to allow it to remain for three or four days. On the third night, the patient suffered from priapism, and felt something give way, which was followed by a discharge of blood, which continued to ooze out until the middle of the next day. It was accompanied by rigors, followed by general fever, and other constitutional derangement, which subsided slowly after the silver catheter had been changed for a No. 6 elastic one. The swelling and hardness in the perineum rapidly diminished, and the patient will soon be restored to health and comfort, passing from time to time a bougie of a size to fill the orifice of the urethra.

It would be useless to multiply the detail of cases of a similar nature, terminating in the same successful manner; and in assuming that there are very few, be their nature what they may, that are not relievable by the same methods of proceeding, I may be perhaps permitted to add, that the surgeon will fail in accomplishing it, unless he has made himself thoroughly acquainted with the anatomy of the parts by dissection, and by a most attentive and frequent examination and consideration of them in the living subject, both in health and under disease. He should believe, if he have not the opportunity of satisfying himself of the fact—1. That the membranous part of the urethra is rarely the seat of obstruction, which is always situated, on the contrary, immediately before it, at the termination of the bulbous portion. 2. That false passages usually begin a little anterior to this part, and pass between the superficial sphincter ani and the compressor urethræ muscles, to the deeper seated sphincter near the termination of the rectum, and backwards towards the bladder. 3. That the surgeon may divide, if he should think fit, an obstruction in any part of the urethra with little danger, as long as he can feel the point of his instrument in the perineum; but that it is dangerous to do so without great caution, and great knowledge of the parts, for the next inch beyond that point, and for this operation the instrument should have a proper curvature. 4. That he can always tell when any instrument enters the false passage, the forefinger being in the rectum, from the comparative thinness of the parts, when the point of it is proceeding in the wrong direction externally to the membranous part of the urethra and its compressor muscle. 5. When he has ascertained by these investigations that the catheter or other instrument is in the false passage, it must be withdrawn, just as far as will remove it to the situation of the passage in the stricture, when the point must be directed into it, the forefinger guiding it inside the compressor muscle, until the point is felt beyond it in the membranous part of the urethra, when the handle of the instrument being depressed, the point will pass on into the bladder. The urine will not, however, always flow through it until the patient rises, and much anxiety may be unnecessarily suffered if this fact should be unknown or neglected.

If every effort made through the urethra should fail in re-establishing the right passage, the perineum must be opened, and the stricture should be perforated or divided, in the manner directed, page 107.

# CHAPTER VI.

## ON SUPPRESSION AND RETENTION OF URINE.

The terms *suppression* and *retention* of urine are commonly and often indifferently used to express an incapability of making water, although technically they imply two very different states: *suppression* being that in which no urine is secreted by the kidneys; *retention* denoting the impossibility of evacuating it from the bladder, in which it is retained in a compulsory manner.

It is not my intention to notice those suppressions of the secretion of urine which have been related by various authors to have occurred, as it were spontaneously in individuals of peculiar constitutions; and in whom some compensatory discharge took place from one or other of the various surfaces of the body; but merely those which are directly connected with the present subject. Any great operation, such as an amputation, will often give rise to a suppression of urine for twenty-four or more hours; but this is usually obviated by opiates and diuretics with antispasmodics, given in moderate but repeated doses; although when the patient has died from exhaustion, or the superadded shock of the operation, it may never have been removed.

When the urethra is pervious, a suppression of the secretion is easily ascertained by the catheter, and the nature of the case is so far understood; but, as the bladder may, from paralysis or from over-distention, have become incapable of discharging its contents, the instrument should in all cases be passed, in order to verify the fact of there being no urine in the bladder. The cause of the suppression must be then strictly investigated. If dependent on alarm, it must be removed by the means indicated; if attributable to inflammation of the kidneys, bleeding and proper antiphlogistic means should be adopted; and if it should depend on obstruction, the nature of it ought if possible to be ascertained, or relief cannot be expected. As one kidney is sufficient for the purpose of secretion, a suppression of the secretion in the other, or an obstruction in one ureter, will not be a positive cause of death, regarding it only as an obstruction; and I am not aware of any means of cure applicable to suppression from disease of this kind on both sides, unless such as nature may herself adopt. I have mentioned an instance in which a cancer of the uterus, extending to and surrounding both ureters, led to a suppression of the secretion, and death; but these causes are rare; and the particular ones to which surgical attention is especially required, are those connected with the bladder. When this viscus is forcibly dilated in consequence of the obstruction of the urethra on the one hand, and the secreting power of the kidney on the other, the peculiar mechanism at the orifices of the ureters is brought into action to obviate mischief, by compressing the necks of these orifices, and thus preventing the flow of urine into the bladder. A partial suppression of the secretion is the result, and thus, if a person could survive long enough, he would die in consequence of its giving rise to low fever, coma, and paralysis, or to sudden death by apoplexy. The urethra however almost always yields, and the retention as well as the suppression is relieved; but, as the urethra does not yield for many hours, and in some cases in which it is not diseased and is capable of undergoing a high degree of irritation for two or even three days, time is allowed for surgery to give relief, if its art and science are properly applied.

The question of time depends on the previous as well as on the present state of disease, and requires judgment in consideration as well as decision in execution. When the patient has suffered long from disease of the urethra with obstruction, and the bladder is very much thickened, it cannot dilate so as to hold any considerable quantity of urine; and all the most violent and distressing symptoms may arise from ten or twelve ounces of water as readily as from two or three pints, and in twelve or eighteen hours as well as in six-and-thirty, or in three days. The size of the bladder being but little augmented in this case, offers no assistance to the judgment: it can scarcely in fact be felt, either above the pubes or through the rectum; and it is on the agony of pain experienced by the patient, on the state of constitution as expressed by his appearance, and on the general symptoms, that the practitioner must depend as his guide. In such a case the patient will be rapidly exhausted, and irreparable mischief may be done to the parts or the constitution, unless relief is early obtained by a surgical operation. As soon as the surgeon sees that the patient is not likely to be relieved by more simple remedies, he ought not to wait until the danger is so far augmented that he has not a moment to lose; for no operation that can be performed or attempted can do half the mischief that will inevitably follow the rupture of the urethra by ulceration, and an extravasation of the urine into the surrounding parts; whilst it also saves the constitution at the moment, and may also be the means of effecting a permanent cure, or at least of a great alleviation of the evil.

If a young man who has been long suffering from repeated attacks of gonorrhœa or gleet, the inflammation of which has extended to the back part of the urethra, exposes himself to cold after drinking a quantity of champagne, *ponche à la romaine, etc.*, he often finds himself unable to make more than a few drops of water, or even to make a single drop, although the desire to do so is most urgent. The inflammatory affection of the urethra has been augmented, and its effects will be most easily obviated by passing a small elastic catheter, which takes off the irritation of the bladder by discharging the urine, and removes the spasmodic or irregular action of the muscles surrounding the urethra. The catheter in such a case should be of small size; and although a gum elastic one is the best, a silver one will often answer very well. If one is not at hand, a common or a catgut bougie may be passed gently through the urethra, and allowed to remain for a few minutes, when the patient should be desired to make an effort as it is withdrawing, when the water will be often found to flow.

A tradesman came to me one evening many years ago, suffering from great irritation in his urethra, with an incapability of passing his urine, except by drops; he had been taking cubebs in large doses, and had exposed himself to cold. I advised him to be cupped on the perineum, to take a dose of physic, a hot hip-bath, and to go to bed. He returned to me in the morning, saying that all these directions had been obeyed, but that he could not pass a drop of water, and was suffering great pain, with a sensation of bursting. I immediately passed a No. 4 silver catheter; it went into the bladder without the slightest hesitation, drew off a large quantity of water, and relieved all his bad symptoms, in a similar manner as in the case noticed page 46. What more could bleeding or anything else have done?

When the surgeon is unacquainted with the state of the urethra, and knows nothing further than that the urine has been evacuated with difficulty or in a very small stream, he will often be foiled in his attempts to get into the bladder, and must then have recourse to general means. It is said he has added by these attempts to the mischief which already existed; but this does not necessarily follow, if he should have proceeded with that caution and gentleness which are necessary, and which have been so strenuously enforced throughout these observations. The patient is also better satisfied, and he submits with more patience to the delay and misery he must endure, before he can obtain relief, whilst, if the operation succeeds, he at once says he is in heaven. If the obstruction is in the first five inches, or from that to five inches and a half, a very small straight gum elastic catheter should be selected, without a stillet, and the urethra should be brought well forward as it is introduced, until it is quite upon the stretch, and by varying the motion of the hands, the point of the bougie may be applied to every part as nearly in succession as possible, with the hope that it may find the opening. If it should do so, it passes on to the bladder, and the catheter should be allowed to remain, lest it should not be again introduced. The eyes of the catheter should be introduced so far into the bladder that they may not irritate its neck; and if the bladder itself should be so irritable as to render its presence very distressing, it may be withdrawn from the bladder, and yet retained in the urethra just beyond the stricture, ready to be passed onwards if required. This is however rarely necessary, for the urine flows readily by the side of it, if the catheter is kept through the stricture. In two or three days the size of the catheter may be increased, and so on, until the cure is completed, or the urethra is restored at least to its natural dimensions. I once, some years ago, introduced a small catheter into the bladder of a gentleman in a case of this kind, and gave him instantaneous relief, but unfortunately withdrew it. The retention of urine did not return, but he made his water with great difficulty, and it was three months before I could again hit the opening and commence the cure. A medical friend of mine had stricture for some years, for which he had been treated by caustic in Paris, and by other means in other places, without effecting a cure, until the stricture became very narrow, and every touch or application to it of any kind whatsoever was sure to bring on a paroxysm of fever, or a fit of retention of urine, which lasted several hours, so that at last he dreaded its being touched in the gentlest manner. I assured him that all this evil arose from the urine passing over the irritable surface of the stricture, and that he must keep the catheter in the bladder so as to prevent its occurrence. This he did; and as the instrument was of the smallest size, the urine soon flowed by the side of it, when a larger one was introduced, and in this gradual manner the irritability, both of the stricture and of the bladder, was overcome, until he could pass his water at all times with ease.

When the obstruction is beyond five inches and a half, or is at the curve of the urethra, the small gum catheter should have a proper curvature; and the stillet may be retained, which even then only gives it a moderate degree of firmness. When a larger one is used without it, its point cannot be retained so readily against the upper surface of the urethra, or directed so easily to any particular part. It may however gain, on the other hand, from its flexibility, and the surgeon should have both kinds ready for use. If after several careful and steady attempts, the gum catheter fails, a small well-polished catgut bougie may be tried; if it can be made to stick in the stricture, it will soften and swell, and dilate the anterior part of it, and as the whole of a stricture relaxes on the dilatation of a part, the urine may and often will flow on the bougie being withdrawn, particularly if this is done during an effort to evacuate it. If this should fail, another catgut bougie may be tried, for the same one will not be fit for immediate use, or a common plaster one may be had recourse to, but if no one will succeed and the case is urgent, recourse must be had to the silver catheter, and the surgeon should be provided with them of two or three curvatures differing from that I have described page 37, to one much less bent, for one will often proceed when the other will not; they should have a pure tin stillet, and a wooden handle with rings, and be about ten inches long. This instrument is to be passed slowly and steadily down to the stricture, the patient either standing or lying on his back, as may be consonant to the usual practice of the surgeon. The catheter should not be larger than No. 3 or 4, or it cannot go through; and if too small at the point it will easily take a wrong direction, and make a false passage, if undue force be applied. The point of the instrument, when it reaches the stricture, should be pressed against it, in order to ascertain the distance; it should then be directed against the lower part of the urethra, and afterwards against the upper, with the view of obtaining a sufficient estimate of its situation. It should then be withdrawn for near an inch; when the parts being put fully on the stretch, it should once more be passed onwards, the point being borne against the upper surface of the urethra until it reaches the obstacle, into which it may perhaps, by gentle pressure, be insinuated. The French surgeons have been in the habit of using a sharp-pointed conical catheter, which they force through the stricture, or something else, and frequently get into the bladder in this way; but this plan should never be followed. It cannot be doubted that some force is necessary, because pressure is force, however gently it may be applied, and men have different ideas of what is or is not gentleness; but a very little practice soon teaches a surgeon what is the extent of it, in the shape of pressure, which he may use without the risk of tearing the urethra, and the sooner he acquires this knowledge the better, because beyond that he must not go. This gentle degree of pressure must be continued for several minutes, until the instrument passes on, or the incapability of overcoming the resistance by fair means is obvious. If the urethra is torn the mischief is increased, for the instrument will always take that course, and the attempt to force the passage should be abandoned for the moment; but a little bleeding is not a sign of laceration, for the stricture is often very vascular as well as sensible, and blood readily flows from a very moderate examination, even without pressure. A surgeon cannot tell what another has done who has preceded him; but he must know when the urethra has yielded from laceration effected by his own hand. The best directed efforts having failed, the patient, if a vigorous man, should be bled from the arm: he should be cupped on the perineum, to the utmost quantity that can be obtained, and which rarely exceeds twelve ounces; or a dozen or twenty leeches may be applied in relays, so as to keep up a constant drain from it, and which bleeding may be encouraged at intervals by the hot hip-bath, or, if the patient wishes rest, by an evaporating bread-and-water poultice. The bowels should be evacuated by a large enema of salts, gruel, and castor or other oil, until the rectum becomes perfectly clear. If the patient should not be a vigorous young man, the loss of blood will do no good, and opium, which is in fact the great, and almost the only heroic remedy in all these cases, should be at once resorted to in larger doses than are ordinarily made use of, or little good will result from it. It should be placed in the rectum, and administered by the mouth. It is contended by some, that opium introduced into the rectum acts more powerfully than when taken into the stomach, which is quite contrary to my experience, and I have been induced to believe that double the quantity is the proper dose by the rectum, whether it be used in a fluid or solid state. It is well known that a person will bear a very large quantity of this drug when suffering from acute or distressing pain, without any ill, or almost any effect being induced; and this holds good so far in all cases of retention of urine, that if the doses are not considerably larger than under more ordinary circumstances, they will fail in producing the desired effect. Three grains of opium should be dissolved in four tablespoonsful, or two ounces of water, for an enema, and four grains of the chloride of mercury, with a grain of opium, should be given in a pill forthwith. I have known the tincture of opium, of which one drachm is a fair dose, excite in the first instance in irritable persons, rather than allay pain, and the solid opium dissolved in water is therefore the preferable remedy. The enema should be repeated, certainly at the end of four hours, if the agonizing straining and pain should continue, and the muriate, or acetate, or bimeconite of morphia may be administered in half-grain or fair doses, with great advantage, as they tend less to confine the bowels than opium, until the patient is fairly under the influence of this remedy. If the cure is to terminate favourably, the irritability of the bladder diminishes, the urgency of the calls to make water are neither so severe nor are they so frequent; the patient slumbers for a few minutes between them, a state of general relaxation takes place, and a few drops of urine follow each other more rapidly than formerly, soon to be succeeded by a small but uninterrupted stream; after which the patient dozes or falls asleep, and is only awakened to obtain perfect relief by emptying the bladder.

The effect of the first or large purgative enema is sometimes great; it brings on the due consent between the parts, and often gives rise to complete relief. If it should not quite do so at once, the opiate injection generally completes it. Purgatives, therefore, are valuable aids; and many persons liable to slight attacks of retention, have recourse, as soon as they begin to feel a difficulty in passing their water, to a strong dose of salts, senna, and manna, and a hot-bath, which usually give the required relief. Castor oil is, however, the most proper remedy, when the stomach will bear it, as it does not irritate the bladder or urethra, and may therefore be taken in the different diseases to which these parts are liable without inconvenience. The hot-bath is a very great assistance in many cases, and is useful in all. I always, however, recommend it at the temperature of 100 to 104, or as hot as the patient can conveniently bear it, and he should remain in it until he is quite faint.

These various means must be continued and repeated, until it is obvious that they are insufficient, and that relief must be obtained by some other and more strictly surgical proceedings. The urine may perhaps drop from the urethra, the patient may be able to collect and show half or even a whole wine-glass full, the bed clothes may be wet from it; but this will not do, it is not that sort of evacuation which is absolutely necessary to give relief. The kidneys secrete more than is discharged, and are willing to secrete still more, if the pressure on them which prevents it were taken off. The bladder is distending in spite of this stillicidium, and the rupture of the urethra is at hand. The agony which the patient endures is great, the anxiety of countenance is strongly marked, the general distress, the great sympathy of the whole system, are too fearfully expressed to be mistaken. The bladder may be felt rising high above the pubes, and descending into the rectum, if it has been capable of dilatation, and the surgeon has only the choice of his operation left. Five are recommended by different modern authors: 1st, to puncture the bladder above the pubes: 2d, through the rectum: 3d, to open the urethra from without: 4th, to divide the stricture and re-establish the passage by an instrument passed along the urethra: 5th, by a judicious combination of both these last methods.

The operation above the pubes is dangerous, inasmuch as an extravasation of urine may readily take place after it, and lead to the formation of matter and other evils of serious magnitude; it should never, therefore, be had recourse to in cases of retention of urine from stricture, although it may be properly done in an impassable state of the prostate gland. The operation through the rectum is easily performed, and is not liable to the same objections, except in the case, which cannot be foreseen, of the peritoneum descending between the bladder and rectum lower than is usual; which is of very rare occurrence, and scarcely forming an exception to the general rule. The best mode of doing it is to cause the patient to lean over the side of the bed, when the forefinger can more readily be introduced into the rectum until it touches the prostate through it. The posterior boundary of this gland being distinguished, the curved trocar and canula are to be introduced, the point of the trocar being withdrawn under cover of the tube until the end of it rests by the side or under the forefinger a little beyond this part, and about or rather short of the middle of that which is called the triangular space. The trocar, covered by the canula, is now to be carried steadily into the bladder, when the trocar is to be withdrawn, and the canula pushed forward so as to secure a free evacuation of the urine. The canula may now in turn be withdrawn, or it may be allowed to remain for twenty-four hours, as its continuing in the bladder longer would only cause irritation, and the opening from the rectum into the bladder will always remain open until the canal of the urethra becomes pervious. There is more danger that it may never close, but degenerate into a fistulous opening, than of its closing too soon; which is one objection to the operation. It is also urged against it, that the disease in the urethra is not removed; but it must be clearly understood, that the disease in the urethra is much more manageable when the pressure upon it of the bladder is taken off, and may be almost if not always successfully treated by one or other of the more gentle means already indicated.

I am disposed, however, in all cases to prefer the course of proceeding I have recommended, page 113, and in the event of its failing, to open the urethra from the perineum, in the manner directed page 107.

When the surgeon is unhappily too late, and the urethra has given way by ulceration behind the stricture, the urine makes its escape into the surrounding cellular texture in the perineum, to which I have alluded page 64; but as this part is bounded posteriorly by the superficial fascia, which turns under the transversi perinæi muscles to join the deep fascia, the urine can only pass upwards and forwards ; it distends, therefore, the scrotum, the integuments of the penis, and often extends even into the cellular structure above the pubes, and on the sides of the abdomen into the groins, but never into the thigh. It has been usual in these cases to scarify the parts deeply so as to allow the urine to drain off, and await the event; but this is rarely sufficient; a fair and free incision ought to be made in the perineum, until the superficial fascia is fully divided, and a direct passage for the urine is obtained. It is not sufficient that incisions be made, for instance, into the scrotum, or the surrounding integuments, with the view of facilitating its evacuation; or that it be even pressed or squeezed out, but the further admission of urine must be prevented, by making such a depending opening as will allow it to run directly off without the least impediment. The catheter should be carried into the bladder through the stricture, in one of the ways recommended from page 107 to 113, and allowed to remain there, provided it does not cause too much irritation.

After the operation has been done, and the safety of the patient has been so far ensured, attention should be especially paid to his general state. Saline medicines, or gentle saline aperients with opiates, will be the best remedies to soothe and allay the constitutional irritation; a stage further, camphor, opium, with saline draughts made with the carbonate of ammonia, will be advantageous; and if gangrene has taken place, ammonia, brandy, quinine, acids, and opium, will offer the best chances of success; but all will and must be useless if the passage of urine is not free, so that no further extravasation can take place. Poultices of stale beer and linseed meal are the best applications, followed by stimulating dressings; but the treatment will be tedious, and the whole skin of the scrotum will be frequently lost, whilst a fistulous opening will remain in the perineum, unless the obstruction in the urethra has been removed.

Erysipelas will sometimes attack the scrotum, and simulate the appearance derived from extravasation of urine. I have seen three cases of this kind, in which the scrotum was so greatly distended, that I was at first sight disposed to attribute it to that cause, but the patients declared they not only could make their water well, but had never had any difficulty in doing it, and a catheter passed into the bladder with ease. These patients recovered, but lost a great part of the skin of the scrotum by sloughing, in spite of several incisions which saved the remaining portion.

A pervious urethra is, as I have noticed page 65, no proof that an extravasation of urine may not be caused by ulceration in it, but then the extravasation does not take place quickly; the scrotum and adjacent parts are not suddenly distended; the swelling commences slowly, is situated in the perineum, where its progress is marked by pain and hardness. It is owing to inflammation, which has taken place outside the urethra, ending in suppuration, and the matter of which cannot find its way to the surface, in consequence of the superficial fascia, which prevent its progress. The pain is often great, the irritation greater, and there may be, and often is retention of urine, although the passage is pervious for a moderate-sized elastic catheter. If a lancet is pushed into a swelling of this kind it always gives relief, although no matter should follow for a day or two. If matter should follow, the relief will be great, and a little urine will be observed to trickle through a day or two afterwards. In some cases the urine starts forth with the matter to a distance on opening the abscess, but even in this case the inflammation, which existed previously to the ulceration of the urethra, will have consolidated the cellular structure, and an abscess will be formed in the usual manner, with its proper sac retaining and preventing the flow of urine from it. This abscess is to be prevented by rest, leeches, fomentations, and the usual antiphlogistic means, without meddling with the urethra; but as soon as the formation of an abscess is certain, the sooner it is opened the better. The wound in it, as well as the ulceration in the urethra, will sometimes heal with the simplest after-treatment. Where a stricture has been the cause of the evil, this does not take place; the ulcer in the urethra, which was at first a rough and rugged hole, becomes callous and irregular at its edge; the surrounding parts are hardened to a greater or less extent, through which a smooth fistulous passage, of narrow dimensions, meanders to the surface, and appears as a small hole, or is situated upon a smooth but irregular pale-coloured fleshy substance, constituting a fistula in perineo. In by far the greater number of cases this will heal up after the stricture has been removed; but in others, the opening remains after the urethra has been restored as nearly as possible to its natural state, and principally from the ulcer in the urethra having made so large a hole that it cannot close up by its own efforts. Under such circumstances the external wound may be laid open and dressed from the bottom with slight stimulants. The nitrate of silver will be found particularly useful, in encouraging the growth of the new granulations; and the use of the actual cautery, by means of a wire heated to a white heat, have also been strongly recommended, the external orifice of the fistula being kept sufficiently open to allow of their application to the parts intended. Many surgeons advise in these cases the dilatation of the urethra beyond its natural size, which appears to be very objectionable when the stricture has been removed. The catheter used should be somewhat less than the size of the orifice of the urethra, but should not be so large as to separate the ulcerated edges and prevent their union, nor so small as to allow the urine to flow by the side of it. The urine will, however, flow by the side of it in most instances, and its occurrence does not appear to prevent the closing of the ulcerated edges, as might have been expected; so that, in fact, a catheter should not be retained permanently in the bladder, until it is found that the hole in the urethra will not fill up as a consequence of the removal of the stricture.

When a portion of the urethra has been lost in a circular form, it is a difficult thing to re-establish the canal. Pressure on the orifice of the fistula, when the opening is small, will often prevent the inconvenience which would otherwise arise from it. A medical friend of mine, who has lost the under part of the canal behind the frœnum, has always a short silver tube in the urethra, having two small holes in it, through which he passes a strong thread, and attaches to it a small piece of sponge, which he says answers perfectly well on all occasions, the only inconvenience being in the trouble of applying it. It has been attempted to cover an opening of this kind, both in the penis and in the perineum, by obtaining portions of skin from the neighbouring parts, somewhat after the manner in which new noses are made. The principal supporter of this plan is Dieffenbach of Berlin, and his practice is detailed in the 10th volume of the Dublin Journal of Medical Science, to which I beg to refer, the performance of the operations he recommends demanding very careful consideration, and the cases requiring them being of rare occurrence.

Retention of urine from enlargement of the prostate gland, or from paralysis of the bladder, do not properly claim attention here, and will be fully noticed hereafter. Some observations on the latter, as connected with stricture, or irritability of the prostatic part of the urethra, will be found in page 146.

# CHAPTER VII.

## ON IRRITATION OF THE MEMBRANOUS AND PROSTATIC PARTS OF THE URETHRA.

The membranous and prostatic parts of the urethra are subject to irritation, occasionally ending in young and middle-aged persons, in inflammation and abscess of the prostate gland; but these complaints are rarely idiopathic, and occur for the most part from irritation, or the extension or metastasis of disease from the anterior portion of the urethra, or from derangement in the secretion of the urine which has rendered it irritating, and are generally curable. The diseases, on the contrary, which afflict elderly persons, and are hereafter to be noticed, usually originate in the gland, with little reference to the urethra generally; and rarely admit of a cure being accomplished, although the symptoms and sufferings of the patient may be greatly relieved. It is satisfactory to know that many cases which were formerly attributed to commencing disease of this part, are now known to have little or no connexion with it, and that it is by no means so often affected as is commonly supposed, particularly in young and middle-aged persons; and although the natural diseases or defects which occur from old age, have no direct connexion with the urethra, it must, however, be admitted that persons who have long laboured under stricture and irritation of the urethra, are more liable to the chronic, and are more obnoxious to the acute diseases of the prostate gland and of the bladder, than those who have been free from these complaints.

A gentleman, twenty years of age, of a healthy appearance and constitution, applied to me in consequence of a desire to make water, which came upon him so frequently as to render him very uncomfortable, more particularly when in company with females, or in the presence of any persons who might be considered a restraint upon him. The desire was so urgent as to render him sometimes incapable of retaining his urine, and was accompanied by pain in the region of the bladder, and in the outer extremity of the urethra. The urine was sometimes much increased in quantity, and was then limpid, as in hysterical women, and alkaline, and was rarely less than neutral. The sound could detect no disease in the bladder, and only a slight irritation in the prostatic part of the urethra and bladder, caused by the altered state of the urine. He had suffered from no known complaint of the kidney, nor could any thing wrong be ascertained in his assimilative powers, nor discerned in his manner of living, save a great propensity for smoking. This was restricted; his diet and exercise were regulated; the mineral acids, quinine, iron, taraxacum, with gentle aperients, were given in turn for some time; under the use of which the urine became by degrees slightly acid, and he has since declared himself to be free from complaint. This state of irritability is sometimes kept up by nervousness alone, and may be cured by a change of society, of habits, by cold bathing, etc. The bladder, in these cases, does not really become less capable of retaining the urine than before, it is only more sensible of its stimulus; and when this is augmented by the urine having become always neutral or alkaline, the general state of health should be attended to, although I have known this state continue for many years without further evil ensuing.

I have met with several instances of a similar kind in young people, evidently arising from diet. One young gentleman, of fourteen years of age, was brought to me by his mother, in consequence of his wetting his bed at night, and of his often making more water than appeared to her to be natural, and which, on examination, proved to be alkaline. He complained of uneasiness at the neck of the bladder, and at the extremity of the urethra, the prepuce having been somewhat elongated in consequence of the pressure occasionally made to prevent it. This young gentleman was slightly made, of a fair complexion, with red hair; and had been living much on oatmeal gruel, always once, and sometimes twice a day. I considered this to be the principal cause of the evil, desired its discontinuance, and directed the exhibition of the mineral acids, with tonics, and the use of good brown wheaten bread and animal food with each meal. His mother has sent me her other son for a different complaint; in consequence, as she says, of the admirable cure I had made of the first.

Scotch boys, who eat quantities of oatmeal porridge, and run free on their native hills, or who perhaps work hard, are not aware of any inconvenience from its use; but the sons of gentlemen, who are more confined, and apply themselves to study, often suffer from complaints of a similar kind, which I have always found relievable by leaving off the porridge, by adopting a meat diet, and by resorting to remedies which amend the health generally.

A middle-aged gentleman complained of an unusual desire to make water, particularly at night, which caused him to get up four or five times, and interfered with his rest. He had heard of such a thing as a prostate gland, and became uneasy, and applied to me. I found, on examination, that there was some little irritability of the prostatic part of the urethra, but no disease of that part. The urine was a little more acid than in a state of health, and his bowels were confined. The passing of a bougie twice at the interval of four days, and two aperient pills at night, composed of four grains of the pil. hydrargyri, and of the extract coloc. comp., with a quarter of a grain of the pulv. ipecacuanhæ, removed his complaint in a fortnight, and restored his natural rest.

In young persons, the membrane lining the prostatic part of the urethra may be alone affected as a consequence of gonorrhœa; in which case it will be either from acute or chronic inflammation, and in both usually extending, in a greater or less degree, to the orifice, or even into the neck of the bladder itself. When the inflammation is acute, the patient is sensible of a great alteration of the symptoms; instead of a considerable discharge, with little pain, and that little confined to the anterior part of the urethra, the discharge nearly ceases, or is greatly diminished in quantity; the pain is now referred to the perineum, and, as the patient expresses it, to the neck of the bladder. He complains of pain above the pubes, which is more or less permanent; of a constant uneasiness deep in the urinary passage, which is frequently augmented to an irresistible desire to make water, which flows with great difficulty, and gives him great pain from the moment it passes from the bladder. The tenderness in the perineum is considerable, accompanied by a disagreeable sense of fulness, which prevents the patient sitting comfortably, unless on a soft cushion; and there is an uneasiness and weight about the hips and left thigh, which increase the anxiety of the patient. The inflammation has, in this case, been suddenly extended to the prostatic part of the urethra, and should be subdued by general as well as local antiphlogistic means. If the person is young and plethoric, blood should be drawn from the arm: twelve or fourteen ounces taken away in this manner often give great relief; and should be followed up by a hot bath at 100°, in which the patient may remain until he nearly faints, which will often alone effect a cure. If the inflammation should continue, cupping on the perineum and on the sacrum should be had recourse to; and leeches should be applied in the perineum and above the pubes, more particularly when pain is experienced in that situation. Active and more particularly local depletion always does the greatest good in these acute attacks of inflammation in young persons; whilst in elderly individuals, when the symptoms are nearly as urgent, although the inflammation is not perhaps so acute, and more confined to the bladder, its efficacy is doubtful, the relief obtained being evanescent, the debility permanent. In these cases (and they are not rare) I believe the difference to be this: in the young person, the inflammatory action is not accompanied, or has not been preceded, by any change of structure; whilst in the elderly man, a change of structure has been slowly going on, upon which the inflammation has supervened. The inflammation, temporarily arrested by the depletion, gradually returns; for the cause which induced it continues to exist, and assists in its reproduction.

The various preparations of opium are most valuable remedies after depletion: they allay irritation, and assist materially in the removal of the inflammation. They should be given in moderate doses, or they may be used per rectum, and ought to be repeated from time to time, so as to keep the irritation under command, and their constipating effects should be obviated by an occasional enema of hot water, by small doses of castor oil, or some other gentle aperient medicine; for drastic purgatives are not useful in acute inflammation of the prostate, although active purgation is advantageous in chronic disease of this organ. The recumbent position should be observed, with the hips rather raised than otherwise. In young persons it will rarely be necessary to introduce a catheter, unless suppuration is about to take place, and there is a retention of urine, when it should always, under such circumstances, be a small and very flexible instrument, which ought to be withdrawn immediately. A catheter is frequently allowed to remain in the bladder, when the inflammation is in a chronic state, with advantage; it is generally injurious when the inflammation of that part is acute; but is frequently useful when there is irritation without inflammation, if that peculiar state can be duly ascertained. The hot bath, used generally, but particularly locally, to the hips, gives considerable relief; and the constitutional derangement, or the febrile symptoms, must be attended to in the usual manner; food being nearly withheld, and the drinks allowed being of the most bland and diluent nature.

When, from the continuance of the disease, the occurrence of rigors, the increase of the febrile symptoms, the augmented sense of fulness and tension in the perineum, and the greater difficulty of making water, the formation of matter may be presumed; an examination per rectum will often give considerable information, in addition to the swelling which may be perceived externally. It is very desirable that an abscess should not break into the rectum, nor that the matter should insinuate itself behind the bladder, nor indeed go anywhere except to the surface; and the same precautions should be observed, and the same practice followed of making an early puncture, as in the case of an abscess by the side of the rectum. If matter should not follow on the first day, it generally will on the second; and the straight sharp-pointed bistoury should be used for this purpose, and pressed on, from the perineum through its deep fascia, by the side of the urethra, and above the rectum, until the surgeon is assured that it has penetrated the swelling; the flow of matter from which will prove the fact, and the slight bleeding which usually follows must under such circumstances do good. An abscess which is opened in this way, or which opens of itself in this manner, usually heals with little difficulty. If it passes behind the bladder death is often the result, after a very prolonged illness, of which I have seen some very unhappy examples.

Sometimes the abscess, if small, cannot be felt per rectum, although the prostate is tender to the touch, nor is it distinguishable in the perineum; under which circumstances it will generally occasion great distress in the attempt to make water, which cannot be accomplished without the aid of a very small gum elastic catheter, and will ultimately break into the urethra.

The following case is remarkable for the great misery which accompanied the complaint, and for the large quantities of opium which were required to give even a moderate relief. A gentleman who had had a No. 10 solid bougie passed, without difficulty, on account of an irritation, and discharge from the urethra, got wet, and caught cold, which brought on a greater desire to make water, with difficulty and pain in the region of the bladder: leeches were applied above and below the pubes in the morning, and were repeated in the course of the day. An enema of two grains and a half of opium was administered, and a grain of calomel and one grain of opium were given every four hours, with another pill composed of two grains and a half of extract of henbane and of hemlock: four injections were required in the first twenty-four hours, and six pills. On the second day, the 5th, the bowels were freely open; but the irritation, and desire to make water, which was then accompanied by straining and pain, had not diminished: three opiate injections were administered, and one of warm water; he took six pills of each kind, and had a hip-bath whenever he pleased: a very small elastic catheter was introduced in the evening, and met with slight obstruction at the prostratic part of the urethra, but no swelling could be felt per rectum. 6th. The pills and enemata repeated; the opium being increased to three grains in each injection. The bowels were opened by castor oil, the catheter passed night and morning: slept towards morning, and was easier. 7th. Continued the enemata of three grains of opium three times in twenty-four hours. Had a draught, of one drachm of tincture of hyoscyamus and an ounce of camphor mixture, every four hours, which quieted a slight degree of nervous excitement. The bowels were opened by four grains of calomel, and four grains of extract of coloc. comp. By these means he was kept tolerably free from pain; but the desire to make water, and the inability to discharge it remained, and sometimes required the catheter to be passed a third time in the twenty-four hours: he ate an egg, some pudding, and took some beef-tea daily. On the 10th, a purulent discharge took place from the urethra, which gave great relief; and on the 12th, he passed his water freely, and slept well: the opium being omitted, with the exception of one injection at night, and the infus. rosæ with the sulphate of quinine were substituted for the henbane draughts. This gentleman was restored to perfect health in a fortnight afterwards, and has since remained free from complaint. He had during eight days three injections into the rectum of three grains of opium each, and took six grains of opium, besides five or six draughts of one drachm of tincture of henbane every twenty-four hours. These quantities merely kept him tolerably quiet, and never caused more than a very moderate degree of sleep for two or three hours at a time, and to them he perhaps owes his life or his senses.

Chronic abscess of the prostate, or rather abscesses, the result of a lower or more chronic inflammation, are a much more frequent disease, occurring generally from forty to fifty, and even to near sixty years of age. They are usually the consequence of stricture, but are not always so; and become complicated with inflammation of the mucous membrane of the bladder, and with disease of the kidney, by which the patient is ultimately destroyed.

In such cases, these abscesses, which are at first circumscribed, often burst into the urethra, when relief is obtained; sometimes they are only discovered after death, and matter can be squeezed from the gland through its ducts, opening into the urethra.

One of my earliest friends was five-and-thirty years ago attacked with uneasiness in the back part of the urethra, a great desire to make water and pain on passing it, without any discharge, but with a sense of fulness in the perineum, and of weight in the hips and loins, which uneasiness was increased on evacuating the bowels. I attributed this to the irritation arising from sitting continually with a lady to whom he was much attached, and whom, for the best of all possible reasons, he could not marry. This lasted three weeks, before it was removed by a strict antiphlogistic plan of treatment. He had another attack, at Lisbon, in 1809, which yielded in a similar manner; and he was quite aware of the difference between this disease and a common gonorrhœa, a disease he had contracted in the interval two or three times, and had been cured in the usual way; the last by commencing immediately with small doses of copaiba, and increasing the quantity until the cure was completed, after the manner that has been since recommended as new. In 1817 he had another attack, which was more obstinate, but ultimately yielded to a similar treatment, with the addition of a mild course of mercury. After this he married, and remained well for several years; but unhappily became a widower, and some months afterwards had a return of his complaint without any very evident cause. All the usual remedies now failed, and his disease gradually increased. During three years, he consulted all the most eminent surgeons in London, and at last died, completely exhausted, under the care of Dr. Prout. On opening the body, I found the prostate almost an empty sac, having been the seat of several abscesses communicating with the urethra. The internal surface of the bladder was in a state of chronic inflammation, but without ulceration, although, from the pain at the extremity of the penis, and the amazing quantity of discharge, almost apparently of a purulent nature, mixed with the urine, considerable ulceration was expected. The ureters were much enlarged, and the kidneys diseased; that of the left side particularly being enlarged, softened, and nearly an empty lobulated bag.

When a stricture has been of many years standing, and frequently impassable, accompanied occasionally by retention of urine for hours, abscess in the prostate occasionally occurs; and the formation of matter is often accompanied by such well-marked paroxysms of fever, as to resemble and be taken for ague. In some instances the fits became even regular for a time, and again irregular. In one gentleman, who had suffered much in this way, I found the prostate hanging as it were in rags. Abscesses extended up between it and the back of the bladder and rectum; and would have killed the patient, if he had not been cut off suddenly by ulceration of the gall-bladder, through the irritation of a large gall-stone. The disease in this case was originally stricture, and the quantity of matter discharged at intervals, together with the particular uneasiness and tenderness of the prostate on examination per rectum, demonstrated the nature of the disease. In cases of this kind, the old disease of the urethra sympathizes with that of the prostate, the stricture becomes more irritable, augments the difficulty in making water, adds to the pain, and renders the misery of the patient almost unendurable.

"Feb. 15, 1830.—(W. F., M.D.) Nearly seven months ago, while riding on horseback in the country, I was surprised one morning to find that I had frequent calls to make water without any obvious cause; and that the contents of the bladder were expelled with force, as if I had been taking a strong diuretic. The urine was of a wheyish colour, unlike the thin, colourless, transparent fluid I had been in the habit of passing in the forenoon. These symptoms continued upon me, and were attended in the course of a few days with ardor urinæ and pain in expelling the last drops, like a wringing tenesmus of the bladder, whenever, more especially, I mistook the call, and went to make water with only a small quantity in the bladder. As I had once in my life, thirty years ago, suffered greatly from stricture, which was finally relieved by the perseverance of Sir E. Home with the caustic bougie, my friend Mr. Guthrie had little doubt of my symptoms being caused by some return of that affection; but a small-sized instrument passed readily, and the stream of urine has never been much diminished or obstructed. Every since that time till very lately, I have been a miserable invalid, suffering at times the greatest distress from irritation, apparently in the urethra, and the spasmodic wringing tenesmus (bearing down) of the bladder above described; and I cannot satisfy myself or believe that any plan of treatment, whether the antiphlogistic, the antispasmodic, the alkaline, the alterative, or the stimulant (with copaiba, etc.), after the fairest trials, were ever of the smallest service to me. No matter what plan I followed, or however rigorously pursued, the quantum of distress was just the same, and the relapses or accessions and paroxysms, without any discoverable or even to be imagined cause, just as frequent.

"An instrument passed into the bladder, always caused the greatest pain when it entered into and passed through the prostate portion of the urethra; and Mr. Charles Bell, on examining the prostate gland, thought he could distinguish a small pouch or abscess there, although at a subsequent examination, that gland appeared almost healthy and natural, yet the symptoms of distress and irritation were then greatly on the increase. The urine, till very lately, has not once been natural; it was first of a wheyish colour, and became afterwards either albuminous or muco-purulent, frequently in a very high degree. The best appearance was like a mixture of honey and water, or rather of honey adulterated with wheaten flour to make it white; at other times, and then I always suffered greatly, it was actually purulent, like the sanious contents of an ill-conditioned abscess; at others, again, the last drops only were thick and white as cream, but it never was woolly or soapy. My state was that of a patient suffering more or less irritation at all times in the urinary passages, and never altogether free from tenesmus of the bladder, with the accession or relapse into great suffering and distress about every week or ten days, when there was always a great discharge of muco-purulent sediment. After these I generally obtained comparative ease; but I possessed no power over their their recurrence, which, for several months, actually seemed to be regularly periodical, rather than to depend upon any causes of exposure to weather or excitement from exercise or fatigue; for the worst of them happened while nursing myself with the greatest care, under the most approved mode of treatment, and what I cannot account for, when I have been reposing in bed after the middle of the night, or earlier in the morning when indulging on my sofa. Even now, when my symptoms are so much mitigated, if there be the smallest tendency to relapse or irritation, it is between the hours of three and six in the morning that I feel the symptoms, in frequent calls to make water, with uneasiness in the urethra. At my worst times these were attended with distinct heavy throbbing, so severe that I could have often believed the bladder itself was in a state of suppuration. Such was my condition when, about three weeks ago, under the advice of Mr. Guthrie, I undertook to inject the bladder with warm water through an elastic gum catheter, which I had attempted repeatedly before with the silver instrument; but the prostatic portion of the urethra would not bear the application. It gave immediate ease; and by perseverance in it once or twice in the day, the urine, in the course of a few days, actually became healthy; the bladder could retain, without pain, twelve, thirteen, or fourteen ounces of urine, and I became free, as nearly as possible, from the symptoms and feelings of disease. The change was so rapid and extraordinary, so much beyond my expectations, and the failure of every other plan of treatment, however skilfully conceived, had been so remarkable, that I could scarcely bring myself to believe or understand how the simple injection of warm water could have wrought such a miracle. Its truth, however, I consider to be established from the fact, that whenever I perceive the smallest tendency to relapse, which, in the sensitive state of my urinary organs, I am sure to feel on exposure to fatigue, the inclemency of the weather, neglect of my bowels, or departure from the strictest regimen in my diet, the warm water then is my sheet-anchor of safety, giving the same relief as it did on the first application.

"June 8th, 1834.—My last report was dated February 1830, now more than four years ago, when I flattered myself I had almost obtained a cure by injecting the bladder with warm water; but this relief did not last, and I ultimately found this remedy as inefficacious as all the others I had tried. The Pareira brava, buchu, uva ursi, the parsley breakstone, galls, etc. were all brought into play in their turn, and all seemed to give some relief at first; but in all the relief was transitory and fallacious: the best of them seemed to be of the pepper tribe, such as the cubebs and the capsicum; but these too have long been discontinued as useless, and given place to the steady use of opium, recommended to me by Mr. Guthrie, from which I derived great comfort, and have been enabled to take exercise and enjoy life in a greater degree than I ever expected in this world. My dose is now, and has been for months past, one grain morning and evening; and when attacked with irritation, I repeat it to as far as three or four times that amount if necessary, and almost always with complete relief. I am not cured, and at my age (61) never expect to be; but when I compare my situation now to what it was several years ago, I am most grateful for the improvement. The urine now is seldom muco-purulent; through the day it often, indeed generally, exhibits, more or less, flakes of albumen floating throughout the mass, and cannot otherwise in any way be called foul or unhealthy, except in the morning, when it is uniformly more loaded with mucus deposits, and less healthy in appearance than at any other time. It is then, too, just before getting up on first awakening that I have always more irritation and uneasiness that at any other time of the day; but at present I can throughout the day retain without distress, ten, twelve, and fourteen ounces of urine, and I am seldom disturbed more than once in the night to make water. When I pass a catheter I feel uniformly excessive tenderness and pain as soon as the instrument enters the membranous portion of the urethra; and there is generally, more especially in the morning, a slight discharge of ropy mucus at the orifice of the urethra, such as is perceived at the termination of the cure of gonorrhœa. For the encouragement of others similarly distressed, I ought also to add, that in all the former part of my life I considered opium to be a drug so inimical to my constitution, as to be inadmissible under any shape. It is now my sheet-anchor, and has proved as useful to my general health as it has been beneficial to my local disease. In the beginning of 1834, the urethra was scarcely pervious to a No. 3 catheter, which I passed with difficulty, in consequence of the return of the old stricture." This gentleman now past seventy years of age, is in excellent health and good condition, capable of enjoying himself at table with his friends, and will, I hope, long continue to do so.

Inflammation, terminating in abscess of the prostrate, is frequently followed by irritability of the neck of the bladder, which is best allayed by washing out the bladder with warm water, and sometimes by leaving in it a small quantity, containing from half a grain to a grain of the acetate or muriate of morphia, by giving these remedies in small doses internally, twice or thrice a day, and in enemata. The soundness of the bladder is perhaps best shown by its capability of containing from eight to twelve ounces of urine at a time: but it is difficult to discriminate between that irritation of the neck of the bladder which arises from sympathy with disease of the kidney, and that which occurs from derangement of the part itself; and it is more difficult at a later period to ascertain which was the primary disease.

When the matter of the abscess has been discharged, change of air, particularly to the sea side, quinine, sarsaparilla, galls, the turpentines and balsams, all in very small doses, so as to be scarcely diuretic, and always to act as it were imperceptibly, often do good; and the patient should preserve as much as possible the horizontal posture, avoiding all unnecessary excitement. The advantages to be derived from the steady use of opium are too clearly shown, in the preceding case, to be disregarded.

If the patient should be affected by the chronic enlargement of the prostate, to which old men are liable, and yet have been so fortunate as to escape suppuration in that part, the irritation of the urethra which was formerly excited in a great degree, gradually diminishes as the prostate enlarges, and the pressure of the urine impelled by the muscular coat of the bladder is taken off, so that a larger catheter can be passed through the urethra than before, and with less inconvenience, which, as will be hereafter shown, is an important point for the patient. The greatest care should be taken in all such cases not to cause any irritation in the urethra, by carefully adapting the size of the instrument to it, and by using it with the greatest gentleness.

In some cases where stricture has existed for a number of years, and in others in which there has been no disease in the urethra, the patient cannot empty his bladder although no derangement can be detected of the prostate, nor of the neck of the bladder. The urine when it flows, passes in a fair stream, but the patient, although sensible of relief from the dilatation or cure of his stricture, feels that his bladder is not empty, he suffers occasionally from incontinence of urine, has a frequent desire to pass water, and particularly at night. The catheter shows that the bladder contains perhaps several ounces when the patient can expel no more. This state is sometimes overcome in young persons, and the bladder recovers its tone, but it is not often effected after the middle period of life, as the complaint is usually dependent on some morbid affection of the spinal marrow. The sexual powers are diminished in an equal proportion, and ineffective priapisms, or tumid states of the penis, take place towards morning; the bowels become very torpid and distended with flatus; there is a sense of fulness and weight in the region of the lower bowels, and aperient medicines are daily required. The patient complains of weakness in his limbs, of pain in the back and down the thighs, of uneasiness in the groins and perineum, and it is soon perceived that he walks unsteadily. The urine after a time deposits a considerable quantity of mucus from the bladder and is sometimes acid, although it is for the most part neutral or even alkaline. This complaint is much more common than has been supposed; I had lately three persons under my care suffering from it at the same time, one of whom brought with him the following statement of his case from Ireland.

" C. C. began, in May 1840, to experience considerable difficulty in evacuating the urine, attended with irritation at the neck of the bladder, dull pain in the perineum, and pain in the glans penis. The urine was passed frequently, and in small quantity. A catheter of large size passed along the urethra easily, till it reached the situation of the prostate gland where a slight obstruction was perceptible, and on withdrawing the catheter it was found smeared with blood at the point. After micturition, some urine still remained in the bladder, for, on introducing the catheter *after* passing the urine, a considerable quantity of that fluid was again evacuated. The urine deposited, on standing, some ropy mucus. Along with these symptoms, a great sense of weight was felt in the hypogastrium, and in both groins, and a difficulty in lifting the lower limbs in progression.

" The alimentary canal was at the same time in a deranged state. The bowels were usually torpid, though occasionally relaxed, and they were in general filled with flatus, accompanied with an uneasy sense of distention of the inferior half of the abdomen. The appetite was usually good, and the functions of the stomach duly performed.

" This state of the urinary bladder, and of the alimentary canal, has continued ever since, more or less, but on the whole has rather undergone some mitigation.

" A larger sized catheter was occasionally passed into the bladder, and the bowels were regulated by mild aperients, lavements, etc. An open state of the bowels greatly relieved all the symptoms, both urinary and intestinal. Much of the distress experienced, seemed referrible to the accumulation of flatus in the bowels."

The regular use of the catheter every night is absolutely necessary for the comfort of this class of patients, washing out the bladder immediately afterwards with cold water, which is in most instances very grateful. When the spinal marrow is first affected, the derangement in the urinary apparatus follows, and the patient only complains of weakness, and of the inconvenience arising from the difficulty he has in retaining his water, which is for the most part more or less neutral; but I have seen patients passing urine in this state highly acid. The bladder is not in the first instance in any degree affected, beyond being defective in muscular power, and may remain so for a great length of time; but where there has been previous irritation in the urethra, it is apt to be propagated to the bladder on the application of any exciting cause, whence the necessity for very gentle local treatment; and although few of these persons are cured, many are much relieved by the regular use of medicines directed for the derangement of the functions of the spinal marrow.

An irritable state of the prostatic part of the urethra and of the neck of the bladder is also dependent upon, or has been caused by some derangement of the brain, and more particularly of the spinal marrow the effect of accident; sometimes relievable, and sometimes not, by art. A gentleman fell from his horse upon his head, and was carried home quite sensible, although deprived of the power of using either arms or legs. In the course of time he slowly recovered, so as to be able to walk with a little limp on one side; and at the end of four years, being accustomed to the inconvenience, he complained only of his very frequent desire to make water. A No. 8 catheter was passed into the bladder with some little pain and difficulty, the obstacle being at its very entrance; three ounces of urine were then drawn off, he having made previously all he could, and which was in a natural state. On the third day he declared himself to have been much relieved by the operation, that a part of the irritability had been removed: three days afterwards a larger catheter was introduced, when a little urine only was drawn off, and he thought himself much improved. By proceeding in this manner, the symptoms were so nearly removed that he thought it useless to continue any further treatment.

This defect in the power of the bladder may amount at last to a complete paralysis. The bladder being unable to contract, becomes distended to a considerable size; but complete retention followed by a suppression of the secretion does not take place, for the neck of the bladder and the sphincter of the urethra having also suffered a diminution of their powers, cannot prevent the escape of the urine under every action of the abdominal muscles, and the patient appears to suffer from an incontinence of urine rather than from a retention. The bladder, if examined after death, under these circumstances, will be found very large, thin and membranous, and of a pale colour. If the complaint should continue without being observed, or the urine should be allowed to collect without being drawn off by the catheter nightly, the bladder becomes chronically inflamed by the altered state of the urine, the kidneys are soon implicated in the disease, the urine becomes albuminous as well as alkaline, and in the end purulent.

This state may occur in females as well as males, and must be treated in them in a similar manner, provided they are past the middle period of life, for young women are subject to retention of urine as an hysterical symptom, and suffer from it as a part of that complaint. They will remain for many hours successively without passing a drop of water, and when the catheter has been introduced, seem to rely upon it, and to abstain from making any effort to relieve themselves, until the distention of the bladder becomes considerable, when the pain which follows forces them to try and to expel its contents. It is now acknowledged, that this symptom will not be cured by the use of the catheter, if continued even for months, and that the urine will flow when the hysterical paroxysm subsides. The catheter should not therefore be used if it can possibly be avoided, and the case should be treated as one of pure hysteria. I have however known young women suffer from such violent and long continued agony, as to become at last insensible; and by a persistence in doing nothing in other cases, the bladder has at last become very much enlarged, and other complaints have been established, which might have been obviated by a little seasonable assistance. When there is great suffering, and the abdomen is tympanitic, and excruciatingly sensible to the touch, enemeta of turpentine and assafœtida, and purgatives repeated from time to time, will frequently give the desired relief. It is a complaint of civilization, very rarely seen among labouring persons, and must be treated accordingly.

The prostatic part of the urethra and the neck of the bladder are often affected in middle-aged persons, and sometimes in young ones, by mere irritation or low inflammation, which gives rise in both to troublesome symptoms. In young persons it is more usually one of the sequelæ of gonorrhœa; in older ones it more often arises from the irritating nature of the urine, which is secreted of an undue quality, depending on a faulty state of the stomach and bowels.

When it follows a gonorrhæa, or has existed for some time as a consequence of it, the cure is to be accomplished by strict attention to the general health, diet, and exercise, and by the use of the bougie. This is to be used only after an interval of three or four days, and should be a very soft one. It gives great pain on passing through the prostatic part of the urethra, and the point of the bougie comes out in all probability tinged with blood and matter. After two or three trials a little purulent matter only is observable, and by a continuance of its use a cure is generally effected; but the patient is liable to a relapse, unless he is very careful to avoid all exciting causes of disease and particularly that of intemperance.

In some obstinate cases in young persons, the irritation of the membranous and prostatic parts of the urethra is accompanied by daily and nightly emissions, which greatly distress the individual, whilst they weaken his personal and mental powers. They are for the most part cured, whatever may have been their cause, by the passage of the soft bougie from time to time, by a regular course of life, and by the abandonment of any vicious habits which may have been contracted. In the more severe cases in which the pressure made by the common bougie gradually augmented in size, does not effect a cure, I have recourse to the argentum nitratum, applied in the form of ointment, by the means I have pointed out page 82, to every part of the membranous and prostatic portions which may be in an irritable state. I have found it very efficient and less likely to cause severe symptoms when carefully used, although they are sometimes excited by it, than any mode of applying it in a solid state. The bladder should be emptied in order to prevent the necessity for the immediate or early passage of urine over the part to which it has been applied, and any severe irritation caused by it should be quieted by the hot-bath, opiate enemata, and leeches if necessary; and recourse should not under any circumstances be had again to this remedy, until all the symptoms of irritation caused by it have passed away, whether the time extends from five to ten, or to fifteen days. Lallemand has published three volumes in praise of the use of the lunar caustic in a solid form, by means of his instrument described page 82; and there is a good review of these books in the 30th number of the British and Foreign Medical Review, to both of which works I refer those who are desirous of seeking for further information on these complaints, which as far as my experience extends, are much less common and more curable in this country than they are said to be in France.

The urethra is occasionally affected sympathetically by disease of the rectum, of so obscure a nature, that the patient is scarcely conscious of any such complaint. The sympathy which exists with hemorrhoids is generally sufficiently marked, and whenever symptoms referred to the urethra cannot be accounted for after an examination of that part, the state of the rectum amongst others should be carefully investigated. I have seen two very remarkable cases of distress, attributed to the urethra, resulting from what is termed a small fissure in a fold of the mucous membrane of the intestine, which remained for a very long time unrelieved by all the means adopted for their cure, until at last the fissures were discovered, and complete relief obtained by the division of the sphincter muscle and of the extremity of the rectum corresponding to the fissure.

An irritable state of the prostate and membranous parts of the urethra can rarely exist long without implicating the neck of the bladder, although it often happens, on the contrary, that the evil begins first in the bladder, from the altered and irritating qualities of the urine; and is gradually propagated to these parts, by extension of derangement in a continuous structure; whence the necessity for attending to the state of the urine in all complaints of the bladder and urethra. Urine when recently voided, and in a healthy state, is about the temperature of 92° of Fahrenheit; quite transparent, and of a light amber colour. It is said to be of an aromatic odour, somewhat resembling that of violets, and of a saline bitter taste. The specific gravity of healthy urine ranges between 1·012 and 1·017, which is quickly and conveniently ascertained by Dr. Prout's Urinometer, which may be purchased in the Urinary Cabinet, made by Messrs. Knight of Foster Lane, together with concise directions for a chemico-pathological examination of the urine, and urinary concretions, by Dr. Venables; which will enable the surgeon, who has not other means at hand, to make use of the different tests and apparatus contained in the Urinary Cabinet, in a satisfactory manner, and by enabling him to discover the morbid conditions of the urine, which he could not do without such examinations, will much facilitate his labours.

It may be observed, that when the irritability of the neck of the bladder, and of the prostatic or other part of the urethra, is caused or continued by an excess of acidity in the urine, it changes its light amber tint, for a darker or copper colour, and resembles Sherry or Madeira wine. It is remarkably transparent on cooling, has a tendency to deposit lithic acid in the form of red crystals or sand, which deposition may be aided by the addition of a small quantity of any dilute acid, and turns the blue litmus paper when dipped into it of a deep red. Lithic acid is always present, and sometimes abounds in healthy urine, combined with ammonia, forming a lithate of ammonia, by which it is held in solution. Lithic acid is very insoluble in water, the lithate of ammonia is not so; urine loaded with it remains transparent while hot, but becomes turbid on cooling, and the lithates are deposited of a yellow or cream, or of a red or a pink colour, after which the urine becomes clear and cloudless above. If the urine and the sediment be again mixed by shaking them in a bottle, and they are then submitted to the heat of a spirit lamp, the turbid fluid becomes clear by the dissolution of the lithates, which are again deposited on the urine becoming cool; by which means these sediments of lithate of ammonia may be distinguished from the phosphates, which sometimes also subside from diffusion through the urine. Transparent urine containing the phosphates in solution, will become cloudy on the application of heat, which property is owing to their being held in solution by excess of carbonic acid. When the transparent urine which deposited the lithate of ammonia has been heated above 160°, it becomes cloudy, and ultimately deposits a coagulum, which may be shewn to be albumen by the addition of some nitric acid, aided by a little heat, in a sufficiently correct manner for ordinary purposes. Urine *cloudy* when *passed* and remaining so after *filtration*, but which on being heated, after the addition of a little acetic acid, becomes *opaque* and deposits a *solid* coagulum, contains albumen. When the urine contains chyle, which is thrown down by similar means, the precipitate thus formed is more floculent than when formed by albumen. When wheyish coloured and turbid urine is heated up to the boiling point, a floculent deposit sometimes takes place, which may be mistaken for albumen, but which consists principally of phosphate of lime; a little nitric acid will redissolve this deposit, and render the whole of the fluid transparent.

Urine of a pale straw colour having the smell of new hay, denotes the presence of sugar, and of diabetes in one or other of its forms. Urine of a pale colour, wheyish looking, and opalescent when passed, and having a strong peculiar urinous smell, is generally *neutral,* and soon becomes alkaline denoting a tendency to the phosphates. Clear, colourless, transparent urine, devoid of smell and taste, of low specific gravity and watery, contains for the most part a large proportion of the alkalies. Urine from 1·020 to 1·025, or 30, of an ale or porter colour, indicates excess of urea. Urine with higher specific gravity, of a transparent pale straw or blueish green colour, denotes diabetes.

When either, or an approximation to either of these different states of urine is observed during the treatment of an obstruction, or of an irritable state of the urethra, the mode of life of the patient must be more strictly attended to. When the urine changes the colour of the litmus paper to a deep red, deposits large quantities of the lithate of ammonia, or throws down crystals of red sand, with or without the addition of a small quantity of any acid, and which more usually takes place towards the middle period of life; the disposition for this complaint is usually formed by too great indulgence in good eating and drinking, combined with deficient exercise and perspiration, and these are the first points to be rectified. One plain dish at most for dinner, with or without one small glass of wine, are all that ought to be allowed, warm clothing should be resorted to, and as soon as the state of the urethra will permit, the patient should take sufficient exercise to cause perspiration twice a day. Cupping on the loins to the amount of ten or twelve ounces is almost always useful, and a purgative of calomel, colocynth and antimony, should be given every second night, followed by a draught composed of senna, manna, and the tartrate of soda or potass, in the morning. It would be even better if the patient would abstain from animal food and wine altogether for a time; and a common saline draught, made with half a drachm of the sesquicarbonate of potass or soda, with half an ounce of fresh lemon juice, three times a day, will in time alter the state of the urine, render it less acid and irritating, and indisposed to deposit red sand, or the lithates of ammonia. When calomel appears to disagree, or the patient is of a weakly temperament, five grains of blue pill may be given with advantage every other night, followed by any saline aperient draught in the morning; and if the patient should be disposed to suffer from gout, two or three grains of the acetous extract of colchicum may be given with the blue pill at night with benefit. The sesqui or bicarbonates of potass and of soda may be given, in persons of a lithic diathesis, two or three times a day, in half a pint of water, an hour or two before or after meals, during and after the previous course, instead of the saline draughts, and recourse may also be had in such cases, by those who can afford it, to the waters of Vichy, in France, whether natural or artificial, which are said to contain eighteen grains of the bicarbonate of soda in a small tumbler of water.

The cure of obstructions and irritations of the urethra, is often delayed and frequently altogether prevented, by the secretion of urine of a totally different and not less irritating character. Large in quantity, of a pale colour, it is rarely passed in a transparent state, being generally wheyish looking, or becoming so on cooling, and deposits a white impalpable powder, composed of the phosphates of ammonia and magnesia, and phosphate of lime. It is sometimes slightly acid when first expelled, although it is more often neutral, and sometimes decidedly alkaline, turning the yellow turmeric test paper, brown. This state of urine at an early period of the complaint is often found to alternate with that which deposits the paler coloured lithate of ammonia, the sediment from the phosphatic urine being either crystalized, of a white and glistening colour, or in an amorphous state. On standing a few hours, it is often covered with a thin shining pellicle, on the under surface of which crystals of the triple phosphate of ammonia and magnesia are rapidly formed, and sink on any agitation of the fluid to the bottom. The water has a peculiar urinous smell, and soon becomes ammoniacal. This state of urine very readily takes place after accidents and injuries to the spine and lumbar regions. It is prone to occur in persons of weakly constitutions, and is preceded and accompanied by a considerable degree of nervous irritability and derangement of the digestive organs. It varies in specific gravity, being often ·20 lower in the morning than at night. The diet of a patient suffering from a complaint of this sort should be plain and simple, of the lightest and most nutritious kind. White fish, poultry, and white meats when they agree, are often better than plain roast mutton or game; boiled eggs, when not coagulated by hard boiling or baking, are easy of digestion, fresh bread and cocoa and milk may supersede tea for breakfast, and a couple of glasses of old sherry for dinner should be recommended. The bowels should be kept gently open by the simplest remedies, such as the confectio sennæ, the pil. rhœi. comp. and castor oil. Saline and mercurial purgatives are generally to be avoided. Opium in small doses repeated at regular intervals from two o'clock in the afternoon until sleep supervenes generally allays irritation, amends the appetite and improves the health, which is greatly sustained in all such cases by the fresh air of the country or the sea. The mineral acids are the best tonics, and the best remedies to alter the irritating character of the urine. The proper period for the administration of the uvaursi, the buchu, and the pareira brava, etc. when the bladder is really compromised, will be noticed hereafter, in the treatment of the diseases of that viscus.

THE END.

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